Stripe

S400 & S600 Maintenance Manual

Zebra

Proprietary Statement

This manual contains proprietary information of Zebra Technologies. It is intended solely for the information and use of parties operating and maintaining the equipment described herein. Such proprietary information may not be used, reproduced, or disclosed to any other parties for any other purpose without the expressed written permission of Zebra Technologies.

Product Improvements

Continuous improvement of products is a policy of Zebra Technologies. All specifications and designs are subject to change without notice.

FCC Compliance Statement

Note: This equipment has been tested and found to comply with the limits for a Class A Digital Device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the product manuals, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

In order to ensure compliance, this printer must be used with a Shielded Power Cord and Shielded Communication Cables.

“The user is cautioned that any changes or modifications not expressly approved by Zebra Technologies could void the user’s authority to operate the equipment.”

Canadian DOC Compliance Statement

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the radio interference regulations of the Canadian Department of Communications.

Liability Disclaimer

Zebra Technologies takes steps to assure that its published Engineering specifications and manuals are correct; however, errors do occur. Zebra Technologies reserves the right to correct any such errors and disclaims liability resulting therefrom.

No Liability for Consequential Damage

In no event shall Zebra Technologies or anyone else involved in the creation, production or delivery of the accompanying product (including hardware and software) be liable for any damages whatsoever (including, without limitation, loss of business profits, business interruption, loss of business information, or other pecuniary loss) arising out of the use of or the results of use of or inability to use such product, even if Zebra Technologies has been advised of the possibility of such damages. Because some states do not allow the exclusion or limitation of liability for consequential or incidental damages, the above limitation may not apply to you.

Copyrights

The copyrights in this manual and the label printer described therein are owned by Zebra Technologies. All rights are reserved. Unauthorized reproduction of this manual or the software in the label printer may result in imprisonment of up to one year and fines of up to $10,000 (17 U.S.C.506). Copyright violators may be subject to civil liability.

Zebra®, Barcode Anything®, Bar-One®, Element Energy Equalizer®, Integration w/o Modification®, Orion®, Stretch®, Stripe®, The World’s #1 Name in Bar Code®, Track-One®, Ultracode®, When It’s on the Line®, Z-Band®, Zebra-Mate®, *Z*-Series™, Z-Ultimate®, ZebraNet®, ZPL II®, and ZPL® are registered trademarks of Zebra Technologies.

All other trademarks and registered trademarks are property of their respective owners.

Copyright © 2002 Zebra Technologies. All rights reserved.

Warranty Information

All Zebra products are sold with warranties. Refer to the User's Guide for warranty information specific to each product. Here is some general information:

PRINTER PRODUCTS:

Printers. All printers (excluding printheads) are warranted against defect in material or workmanship for twelve (12) months from the purchase date.

Proof of purchase or shipment date is required to validate the warranty period. The warranty becomes void if the equipment is modified, improperly installed or used, damaged by accident or neglect, or if any parts are improperly installed or replaced by the user.

NOTE: Products returned must be packaged in the original or comparable packing and shipping container. In the event equipment is not so packaged, or if shipping damage is evident, it will not be accepted for service under warranty. Surface transportation charges for return to customers in the continental United States is paid by Zebra. Otherwise, Zebra pays CPT (carriage paid to) nearest airport; customer pays customs, duties, taxes, and freight from airport to destination. If Zebra determines that the product returned for warranty service or replacement is not defective as herein defined, the customer will pay all handling and transportation costs.

Printheads. Since printhead wear is part of normal operation, the original printhead is covered by a limited warranty as indicated below. Warranty period begins on purchase date.

Printhead	Warranty Period
Barcode label printer printheads	6 months
Card printer printheads	12 months

To qualify for this warranty, the printhead must be returned to the factory or to an authorized service center. Customers are not required to purchase Zebra supplies (media and/or ribbons) for warranty qualification. However, if it is determined that the use of other manufacturer supplies has caused any defect in the printhead for which a warranty claim is made, the user is responsible for Zebra's labor and material charges required to repair the defect. The warranty becomes void if the printhead is physically worn or damaged; also if it is determined that failure to follow the preventive maintenance schedule listed in the User's Guide has caused defect in the thermal printhead for which a warranty claim is made.

Software. Software is warranted to be free of defects in material and workmanship for 30 days from the date of purchase. In the event of notification within the warranty period of defects, Zebra will replace the defective diskette or documentation.

Batteries. Mobile printer batteries are warranted to be free of defects in material and workmanship for 90 days from date of purchase. In the event of notification within the warranty period, Zebra will replace the defective battery provided there had not been damage resulting from user abuse.

Parts. All parts, maintenance kits, options kits, and accessories are warranted to be free of defects in material and workmanship for 90 days (except where otherwise denoted) from date of purchase. This warranty becomes void if the item is modified, improperly installed or used, or damaged by accident or neglect.

SUPPLIES PRODUCTS:

Supplies are warranted to be free from defect in material and workmanship for a period of six (6) months for media and twelve (12) months for ribbon from the date of shipment by Zebra. This is provided the user has complied with storage guidelines, handling, and usage of the supplies in Zebra printers.

Zebra's sole obligation under these warranties is to furnish parts and labor for the repair or possible replacement of products found to be defective in material or workmanship during the warranty period. Zebra may in its discretion issue a credit for any such defective products in such amount as it deems reasonable.

Warranty Exclusions & Conditions Statement

The warranties provided above are the only warranties applicable. No other warranties, expressed or implied, are given. Zebra does not make any IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE in connection with its sale of products or services. While Zebra's desire is to be responsive to specific needs and questions, Zebra does not assume responsibility for any specific application to which any products are applied including, but not limited to, compatibility with other equipment. All statements, technical information or recommendations relating to Zebra products are based upon tests believed to be reliable yet do not constitute a guaranty or warranty.

Zebra's maximum liability for warranty claims is limited to the invoice price of the product claimed defective. Zebra does not assume responsibility for delays or replacement or repair of products. Zebra shall not under any circumstances whatsoever be liable to any party for loss of profits, lost data, diminution of good will, or any other special or consequential damages whatsoever with respect to any claim made under agreement with Zebra. Specifically for software, Zebra is not liable for any incidental or consequential damages caused by abuse or misapplication of the software or by its use in violation of the U.S. copyright law or international treaty.

No salesperson, representative, or agent of Zebra is authorized to make any guaranty, warranty, or representation that contradicts the foregoing. Any waiver, alteration, addition or modification to the foregoing warranties must be in writing and signed by an executive officer of Zebra to be valid.

Table of Contents

Section 1 Description of Equipment

Description 1-1
Printer Operating Modes 1-1
Specifications 1-2
Agency Approvals 1-2
Bar Codes 1-2
Electrical Requirements 1-2
Environmental Ranges for Operation and Storage 1-2
Fonts 1-3
Standard Printer Fonts 1-3
Bitmapped Fonts 1-3
Scalable Fonts 1-3
International Characters 1-3
Optional Fonts 1-3
Media Considerations 1-4
Media Handling 1-4
Memory 1-5
Microprocessor 1-5
Options 1-5
Physical Dimensions 1-5
Printing Considerations 1-6
Printing Method 1-6
Print Speeds 1-6
Ribbon Considerations 1-7
Zebra Programming Language (ZPL II) 1-7
Communication Interfaces 1-8
Communication Specifications 1-9
Serial Data Communication Interface Overview 1-9
Standard Serial Communication Connector 1-9
RS-232 Interconnection 1-10
Serial Communication Signal Levels 1-12
RS-232 Transmit and Receive Data 1-12
Centronics Parallel Data Port 1-12
Parallel Port Interconnections 1-12
Parallel Data Signal Levels 1-12
Electronics System Block Diagram 1-14

Section 2 Operations Overview

Operator Indicators 2-1
Power Status Indicator (green) 2-1
Printhead Status Indicator (yellow) 2-1
Paper/Ribbon Status Indicator (yellow) 2-1
Pause Status Indicator (yellow) 2-1
Data Status Indicator (green) 2-1
Darken Status Indicator (yellow) 2-2
Position Status Indicator (yellow) 2-2
Calibrate Status Indicator (yellow) 2-2
Operator Controls 2-3
Pause Key 2-3
Feed (s) Key 2-3
Cancel (t) Key 2-3
Mode Key 2-3
Power ON/OFF Switch 2-3
Accessing the Printer 2-5
Media Loading 2-6
Tear-Off Mode Media Loading 2-6
Cutter Mode Media Loading 2-6
Peel-Off Mode Media Loading 2-9
Removing the Liner 2-10
Adjusting the Media Sensor 2-10
Media Sensor Adjustment for Non-Continuous Media 2-10
Media Sensor Adjustment for Continuous Media 2-11
Ribbon Loading 2-12
Adjusting the Ribbon Supply Spindle 2-12
Normal Position 2-12
Low-Tension Position 2-12
Loading the Ribbon 2-13
Removing Used Ribbon 2-13
Data Cable Installation 2-14
Power-On Self Test 2-14
Additional Printer Self Tests 2-14
Printer Self Test/Reset Default Quick Reference Chart 2-15
Cancel Key Self Test 2-16
Pause Key Self Test 2-17
Feed Key Self Test 2-18
Mode Key Self Test 2-19
Feed and Pause Key Factory Default Reset 2-19
Feed, Pause and Mode Key Reset (Communication Parameter Default) 2-19

Calibration 2-21
Auto Calibration 2-21
Manual Calibration 2-22
Ribbon Parameter Calibration 2-23
Configuration Mode 2-23
Print Darkness 2-23
Printing and Examining a Configuration Label 2-24
Testing Print Darkness (Feed Key Self Test Method) 2-24
Testing Print Darkness (Pause Key Self Test Method) 2-25
To Set Darkness Setting Manually 2-25
To Start the Pause Key Self Test 2-25
Adjusting the Printer Darkness 2-26
Tear-Off Position Adjustment 2-27
Top of Label Position Adjustment 2-28
Routine Adjustments 2-29
Printhead Pressure Adjustment 2-29
Liner Rewind Power Roller Adjustment 2-30
Adjusting the Rewind Power Roller 2-30

Section 3 Troubleshooting

Troubleshooting Charts 3-1
List of Tables 3-1
LED Quick Reference Chart 3-2
Troubleshooting Chart (Problems with LED Indications) 3-3
Troubleshooting Chart (Wrinkled Ribbon) 3-8
Troubleshooting Chart (Jammed or Stuck Labels) 3-8
Troubleshooting Chart (Settings or Parameter-Related) 3-9
Printer Status Sensors 3-9
Troubleshooting Chart (Cutter-Related) 3-9
Factory Assistance 3-11
ZIP Support 3-11
Technical Support 3-11
Repair Service Department 3-11
Returning Equipment 3-11

Section 4 Preventive and Corrective Maintenance

Maintenance Concepts 4-1
Equipment Safety Tips 4-2
Equipment Safety Tips (Continued) 4-3
Personal Safety Tips 4-4
Preventive Maintenance Schedule 4-5
- Cleaning – General 4-5
- Cleaning – Printhead and Platen Roller 4-7
- Printhead and Platen Roller Cleaning Procedure 4-8
- Cleaning the Cutter Module 4-9
  - Remove the cutter module from the printer. 4-9
  - Disassembling the Cutter Module 4-11
  - Cleaning the Cutter Module 4-12
  - Reassemble the Cutter Module 4-12
  - Reinstall the Cutter Module 4-14
  - Test the Cutter Operation 4-14

Lubrication 4-15
Diagnostics 4-15
- Printer Self Test/Reset Default Quick Reference Chart 4-15
- Pause and Cancel Key Self Test 4-16
- Feed and Cancel Key Self Test 4-16

Extended Printer Diagnostics 4-22
- Pause Key Loopback Test 4-22
- Feed Key Rollback Test 4-23

Mechanical Adjustments 4-23
- Printhead Position Adjustment 4-23
- Take-Label Sensor Adjustment 4-26
- Strip-Plate Adjustment 4-27
- Liner Rewind Spindle Adjustment 4-28

Electrical Adjustments 4-29
- Printhead Voltage Adjustment 4-29
- Cutter Voltage Adjustment 4-32

Corrective Maintenance 4-34
- Tools Required 4-34
- Removing the Main Door 4-34
- Removing the Front Door 4-34
- Removing the Rear Cover 4-34
- Tear-Off Plate Removal 4-36
- Control Panel Assembly Removal 4-36
- Control Panel Circuit Board Replacement 4-37
- Main Logic Board Removal 4-38
- Main Logic Board Installation 4-38

Downloading Firmware 4-39
Print Mechanism Assembly Removal 4-40
Printhead Assembly Removal and Installation 4-41
Ribbon Supply Spindle Disassembly 4-44
Ribbon Supply Spindle Installation 4-45
Media Sensor Assembly Removal 4-49
Media Sensor Assembly Installation 4-49
Main Drive Belt Removal, Replacement, and Adjustment 4-51
Printers without the Peel-Off Option 4-51
Printers Equipped With the Peel-Off Option 4-51
Platen Roller Replacement 4-53
Ribbon Take-Up Motor Replacement 4-55
Stepper Motor Replacement 4-56
Power Supply Board Removal 4-57
Power Supply Board Installation 4-58
AC Power Fuse Replacement 4-61
Options 4-62
Memory Upgrade Kit Installation Instructions 4-62

Section 5 Maintenance and Assembly Drawings

Description 5-1

Table of Contents

List of Figures

Figure 1-1. Safety Organizations 1-2
Figure 1-2. Communication Cable Connections 1-9
Figure 1-3. RS-232 Connections..... 1-10
Figure 1-4. RS-232 Signal/ASCII Code Data 1-12
Figure 1-5. Electronic Block Diagram..... 1-14
Figure 2-1. Front Panel 2-2
Figure 2-2. Power-On/Off Switch and Data Cable Connections 2-4
Figure 2-3. Printer Access..... 2-5
Figure 2-4. Roll Media Loading 2-7
Figure 2-5. Fanfold Media Loading 2-7
Figure 2-6. Cutter Mode Media Loading 2-8
Figure 2-7. Peel-Off Mode Media Loading 2-8
Figure 2-8. Media Sensor Adjustment..... 2-11
Figure 2-9. Dual-Tension Ribbon Supply Spindle Adjustment 2-12
Figure 2-10. Ribbon Loading Diagram 2-13
Figure 2-11. Cancel Key Self Test Printout (Configuration Label) 2-16
Figure 2-12. Pause Key Self Test Printout..... 2-17
Figure 2-13. Feed Key Self Test Printout..... 2-18
Figure 2-14. Mode Key Self Test Printout 2-19
Figure 2-15. Tear-Off Position Adjustment..... 2-27
Figure 2-16. Adjusting the Print of the Top of Label..... 2-28
Figure 2-17. Printhead Pressure Adjustment 2-29
Figure 2-18. Liner Rewind Power Roller 2-31
Figure 4-1. Main Door and Front Door 4-8
Figure 4-2. Printhead Cleaning 4-9
Figure 4-3. Cutter Catch Tray Location..... 4-10
Figure 4-4. Cutter Connector and Mounting Screw..... 4-10
Figure 4-5. Cutter Module Removal 4-11
Figure 4-6. Cutter Module Disassembly..... 4-12
Figure 4-7. Cutter Module Reassembly 4-13
Figure 4-8. Side View of Cutter Module Reassembly 4-13
Figure 4-9. Reassembled Cutter Module 4-14

List of Figures

Figure 4-10. Cutter Module Reinstallation 4-15
Figure 4-11. Pause and Cancel Key Label 4-18
Figure 4-12. Test, Formats 1 and 8 4-19
Figure 4-13. Test, Formats 2 and 9 4-19
Figure 4-14. Test, Formats 3 and 10 4-20
Figure 4-15. Test, Formats 4 and 11 4-20
Figure 4-16. Test, Formats 5 and 12 4-21
Figure 4-17. Test, Formats 6 and 13 4-21
Figure 4-18. Test, Formats 7 and 14 4-22
Figure 4-19. Printhead Pressure Screws 4-23
Figure 4-20. Printhead Position Adjustment (Top View) 4-25
Figure 4-21. Take-Label Sensor Location 4-26
Figure 4-22. Strip Plate Adjustment 4-27
Figure 4-23. Liner Rewind Spindle Adjustment 4-28
Figure 4-24. Printhead Voltage Adjustment Potentiometer Location 4-31
Figure 4-25. Properly Adjusted Cutter Sensor 4-33
Figure 4-26. Home Position Potentiometer 4-33
Figure 4-27. Opening Main and Front Doors 4-35
Figure 4-28. Door and Cover Disassembly 4-35
Figure 4-29. Tear-Off Plate 4-36
Figure 4-30. Control Panel Assembly 4-37
Figure 4-31. Main Logic Board 4-39
Figure 4-32. Printhead Cable Ferrite assembly 4-40
Figure 4-33. Braided Ground Strap Location 4-42
Figure 4-34. Print Mechanism Assembly Mounting Screw Location 4-42
Figure 4-35. Printhead Assembly Removal/Installation 4-43
Figure 4-36. Dual-Tension Ribbon Supply Disassembly 4-44
Figure 4-37. Ribbon Supply Spindle Subassembly Installation 4-45
Figure 4-38. Spindle Assembly Installation 4-46
Figure 4-39. Spindle Assembly Installation 4-48
Figure 4-40. Spindle Assembly & Outer Spindle (Expanded) 4-48
Figure 4-41. Spindle Assembly & Outer Spindle (Retracted) 4-48
Figure 4-42. Media Sensor Assembly 4-50
Figure 4-43. Main Drive Belt Replacement and Adjustment 4-50
Figure 4-44. Peel-Off Drive Belt Adjustment 4-52
Figure 4-45. Platen Roller Replacement 4-54

List of Figures

Figure 4-46. Replacing the Platen Roller 4-54
Figure 4-47. Ribbon Take-Up Motor 4-55
Figure 4-48. Stepper Motor (Media Side) 4-56
Figure 4-49. Stepper Motor (Electronics Side) 4-57
Figure 4-50. Power Supply Assembly Removal 4-59
Figure 4-51. Power Supply Assembly Exploded View 4-60
Figure 4-52. Fuse Holder Location 4-61
Figure 4-53. Main Logic Board Conntector and Mounting Screw Location 4-62
Figure 4-54. Memory Board 4-63
Figure 4-55. Memory Board Mounting Screws 4-64
Figure 4-56. Sample Before and After Configuration Labels (8 MB Memory Board Installed) 4-66
Figure 5-1. Cover Assemblies 5-3
Figure 5-2. Logic Board and Control Panel 5-5
Figure 5-3. Media Supply, Ribbon Supply, and Ribbon Take-Up 5-7
Figure 5-4. Toggle and Print Mechanism 5-9
Figure 5-5. Print Mechanism and Printhead Assembly 5-11
Figure 5-6. Tear/Cutter Media Sensor, Ribbon Guides, and Media Guide 5-13
Figure 5-7. Peel-Off Option (Front View) 5-15
Figure 5-8. Tear/Cutter Drive System 5-17
Figure 5-9. Peel Option and Peel Drive System 5-19
Figure 5-10. Platen and Power Supply 5-21
Figure 5-11. Cutter Option 5-23

List of Figures

List of Tables

Table 1-1. Font Matrix for 8 dot/mm (203 dpi) Printheads 1-3
Table 1-2. Media Specifications 1-4
Table 1-3. Memory Specifications 1-5
Table 1-4. Physical Dimensions 1-5
Table 1-5. Printing Specifications 1-6
Table 1-6. Print Speeds 1-6
Table 1-7. Ribbon Specifications 1-7
Table 1-8. DP-9P Pinouts 1-11
Table 1-9. Centronics Connector Pinouts 1-13
Table 2-1. Self Test and Calibration Quick Reference Chart 2-15
Table 2-2. Factory Default Values 2-20
Table 3-1. LED Quick Reference Chart 3-2
Table 3-2. Troubleshooting Chart (Problems with LED Indications) 3-3
Table 3-3. Troubleshooting Chart (Print or Print Quality Related Problems 3-6
Table 3-4. Troubleshooting Chart (Wrinkled Ribbon) 3-8
Table 3-5. Troubleshooting Chart (Jammed or Stuck Labels) 3-8
Table 3-6. Troubleshooting Chart (Settings or Parameter Related) 3-9
Table 3-7. Troubleshooting Chart (Cutter Related) 3-9
Table 3-8. Explanation of Sensors 3-10
Table 4-1. Recommended Cleaning Schedule 4-6
Table 4-2. Self Test and Calibration Reference Table 4-17
Table 4-3. Sequence of Formats 4-18
Table 4-4. Printhead Voltage Values (S400 Only) 4-30
Table 4-5. Printhead Voltage Values (S600 Only) 4-30
Table 5-1. Cover Assemblies 5-2
Table 5-2. Logic Board and Control Panel 5-4
Table 5-3. Media Supply,m Ribbon Supply, and Ribbon Take-Up 5-6
Table 5-4. Toggle and Print Mechanism 5-8
Table 5-5. Print Mechanism and Printhead Assembly 5-10
Table 5-6. Tear/Cutter Media Sensor and Ribbon Guide 5-12
Table 5-7. Peel-Off Option (Front View) 5-14
Table 5-8. Tear/Cutter Drive System 5-16
Table 5-9. Peel-Off Option Drive System 5-18
Table 5-10. Platen and Power Supply 5-20
Table 5-11. Cutter Option 5-22

List of Tables

Section 1
Description of Equipment

Description

The Zebra Stripe *S*400 and *S*600 Thermal Printers are versatile label and ticket printers designed to print high-quality bar codes, various sizes and styles of alphanumeric characters, and graphics in either the thermal transfer or direct thermal mode. The Zebra Stripe printers have the flexibility to meet a wide variety of applications. Zebra Programming Language II (ZPL II) allows the programmer to format the printed material. ZPL II is transparent to protocol converters and allows the Zebra Stripe printers to be easily integrated with most systems and host mainframes.

Printer Operating Modes

Tear-Off Mode. When the media is in the rest (idle) position, the webbing between labels is over the tear-off/peel-off plate. To print a label, the printer first backfeeds the media until the start of the label is directly under the printhead, then prints the entire label. The operator then tears off the label, and a new label can be printed.

Peel-Off Mode. When the media is in the rest (idle) position, the start of the label to be printed is slightly in front of the printhead. To print a label, the printer first backfeeds the media until the start of the label is directly under the printhead, then prints the entire label.

In this mode, once the label is printed, the media passes over the tear-off/peel-off plate at a sharp angle. The liner is peeled away from the label and winds around the liner rewind spindle. The media feeds forward until most of the label hangs loose from the liner. The label-available sensor detects this label and pauses printing until the operator removes the label, then the next label prints.

The liner rewind spindle holds one half of the liner from a standard size media roll. The rewind spindle full sensor detects when the spindle is full, then pauses.

Cutter Mode. When the media is in the rest (idle) position, the start of the label to be printed is directly under the printhead. The printer prints the entire label and automatically cuts the label after it is printed. The cutter catch tray catches the completed labels.

The cutter automatically cycles through one cutting motion when the printer's power is turned On (**I**). When printing labels, cutter activation is determined by a command sent to the printer by the host computer from either ZPL II or from a different software driver.

External Rewind Mode. Some applications call for the media to be rewound onto a core as the labels are printed. The Stripe printer does not have an internal media rewind capability. The liner rewind spindle is not designed to rewind label stock. An external rewinder is required for this application. An external rewinder is not available from Zebra Technologies.

When the media is in the rest (idle) position, the start of the label to be printed is directly under the printhead. After the label is printed, the media feeds forward until the start of the next label is under the printhead. The media never backfeeds in this mode. When the printer completes a batch of labels, printing stops. The speed and tension of the rewind operation is strictly a function of the external rewind unit.

Specifications

Agency Approvals

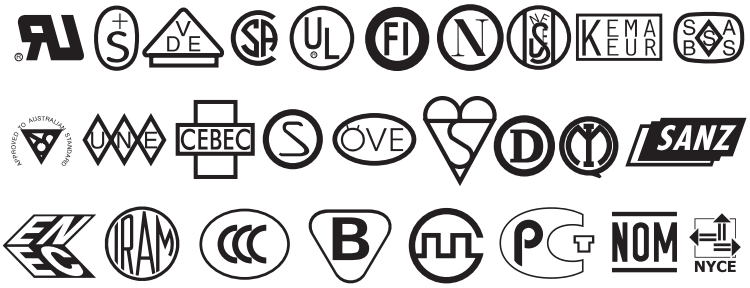

Figure 1-1. Safety Organizations

Bar Codes

The following bar codes are available:

- Check digit calculation where applicable
- Codabar (Supports ratios of 2:1 and 3:1)
- Codablock
- Code 11
- Code 39 (Supports ratios of 2:1 and 3:1)
- Code 49
- Code 93
- Code 128 (Supports serialization in all subsets B and C and UCC Case C Codes)
- Datamatrix
- EAN-8, EAN-13, EAN EXTENSIONS
- Industrial 2 of 5
- Interleaved 2 of 5 (Supports ratios of 2:1 and 3:1 and supports Modulus 10 Check Digit)
- LOGMARS
- MaxiCode
- MSI
- PDF 417
- Plessey
- POSTNET
- QR
- Standard 2 of 5
- UPC-A, UPC-E, UPC EXTENSIONS
- Micro PDF417

Electrical Requirements

Auto select 110 VAC ±20% or 230 VAC ±15%, 48–62 Hz

3 Amps @ 110 VAC, 1.5 Amps @ 230 VAC

Environmental Ranges for Operation and Storage

Operating Temperature: +40° F to +105° F (5° C to 40° C)

Storage: –40° F to +140° F (–40° C to +60° C)

Relative Humidity (Operating): 20% to 85% non-condensing

Relative Humidity (Storage): 5% to 85% non-condensing

Fonts

Standard Printer Fonts

Table 1-1. Font Matrix for 8 dot/mm (203 dpi) Printheads

Font	Matrix					Type*	Character Size					
							Inches			Millimeters		
	Height	Width	Baseline Dots	Inter-Character Gap	Cell Width	Font Matrix	Height	Width	Char/ Inch	Height	Width	Char/ mm
A	9	5	7	1	6	U-L-D	0.044	0.030	33.87	1.13	0.75	1.33
B	11	7	11	2	9	U	0.054	0.044	22.58	1.38	1.13	0.89
C, D	18	10	14	2	12	U-L-D	0.089	0.059	16.93	2.25	1.50	0.67
E	28	15	23	5	20	OCR-B	0.138	0.098	10.16	3.50	2.50	0.40
F	26	13	21	3	16	U-L-D	0.128	0.079	12.70	3.25	2.00	0.50
G	60	40	48	8	48	U-L-D	0.295	0.236	4.23	7.50	6.00	0.17
H	21	13	21	6	19	OCR-A	0.103	0.094	10.69	2.63	2.38	0.42
GS	24	24	24	2	26	SYMBOL	0.118	0.128	7.82	3.00	3.25	0.31
P	20	18	N/A	N/A	N/A	U-L-D	0.098	0.089	N/A	2.50	2.25	N/A
Q	28	24	N/A	N/A	N/A	U-L-D	0.138	0.118	N/A	3.50	3.00	N/A
R	35	31	N/A	N/A	N/A	U-L-D	0.172	0.153	N/A	4.38	3.88	N/A
S	40	35	N/A	N/A	N/A	U-L-D	0.197	0.172	N/A	5.00	4.38	N/A
T	48	42	N/A	N/A	N/A	U-L-D	0.236	0.207	N/A	6.00	5.25	N/A
U	59	53	N/A	N/A	N/A	U-L-D	0.290	0.261	N/A	7.38	6.63	N/A
V	80	71	N/A	N/A	N/A	U-L-D	0.394	0.349	N/A	10.00	8.88	N/A

*U = Uppercase, L = Lowercase, D = Descenders

Bitmapped Fonts

Zebra standard A, B, D, E, F, G, E, H, and GS.

Standard magnification up to 10 times vertical and horizontal independent.

Scalable Fonts

One smooth font, CG Triumvirate™ Bold Condensed, has the ability to expand using the standard Zebra expansion routines, expanding on a dot-by-dot basis, height and width independent, while maintaining smooth edges, to a maximum of 1500 × 1500 dots.

International Characters

IBM Code Page 850 — International Character Sets available in fonts A, B, D, E, F, G, and ∅ through software control.

Optional Fonts

Factory/Field-Installed Scalable: Futura, CG Triumvirate, CG Palacio, Univers, GC Triumvirate Condensed, Century Schoolbook, Cyrillic, East European, Turkish, Greek.

Factory/Field Installed Bitmapped: Futura Bold, CG Triumvirate Bold, CG Palacio Bold, CG Times Bold, Univers Bold, CG Triumvirate Bold Condensed.

Media Considerations

Table 1-2. Media Specifications

	*S*400	*S*600
Minimum media width	0.75" (19 mm)	
Maximum media width	4.5" (114 mm)	
Maximum media width (cutter installed)	4.0" (102 mm)	
Minimum media length (Tear-Off)	0.63" (16 mm)	
Minimum media length (Peel-Off)	1.0" (25 mm)	
Minimum media length (Cutter)	1.5" (38 mm)	
Maximum media length	36" (914 mm)	39" (990 mm)
Total thickness (includes liner)	0.0023" to 0.012" (0.058 mm to 0.305 mm)	
Core size	3.0" (76 mm)	
Maximum roll diameter	8" (203 mm)	
Minimum Inter-label gap	0.08" (2 mm)	0.118" (3 mm) preferred
Maximum Inter-label gap	0.16 (4 mm)	
Ticket/tag notch size (W × L)	0.08" × 0.48 (2 mm × 12 mm)	

Media Handling

Tear-Off Mode: Labels produced in strips.
Peel-Off Mode*: Labels dispensed and peeled from the liner.
Cutter Mode*: Labels are printed and individually cut.
Rewind Mode*: Labels are externally rewound (requires optional media rewinder — not available from Zebra Technologies).

* These options are not found on all printers.

Memory

Table 1-3. Memory Specifications

	*S*400	*S*600
Flash ROM (firmware)	1 MB	1 MB
Standard DRAM	1 MB	2 MB
Available Standard Flash Memory	0	1 MB
Memory Upgrades (Options)	4 MB & 8 MB Flash Modules	4 MB & 8 MB Flash Modules

Microprocessor

32 Bit RISC

Options

1 MB Flash expansion (*S*400 only)*

4 MB Flash expansion

8 MB Flash expansion

Peel-Off mode with liner-only rewind feature*

Cutter with label catch tray*

Scalable and bitmap smooth fonts available for text

Ethernet

* Factory-installed (contact your authorized Zebra distributor for information).

Physical Dimensions

Table 1-4. Physical Dimensions

*S*400 & *S*600		
Height	13"	330 mm
Width	8.25"	210 mm
Depth	17"	432 mm
Weight (without options)	17 lbs	7.71 kg

Printing Considerations

Table 1-5. Printing Specifications

	*S*400	*S*600
Resolution	203 dots per inch (8 dots per mm)	
Dot Size	0.005" (0.127 mm)	
Minimum print width	0.75" (19 mm)	
Maximum print width	4.09" (104 mm)	
Minimum print length	0.005" (0.127 mm) (1 dot row)	
Maximum print length	36" (914 mm)	39" (990 mm)
Bar code modulus (“X”) dimension	5.0 mil to 55.0 mil	

Printing Method

Direct Thermal Printing (requires direct thermal media). A substrate, typically paper, is coated with a chemical that changes to a dark color upon exposure to heat over a period of time to form an image.

Thermal Transfer Printing. The printhead is in contact with a ribbon that releases ink above a certain threshold temperature.

Print Speeds

Table 1-6. Print Speeds

	*S*400	*S*600	
Programmable constant printing speeds.	2.4" (61 mm)	2.4" (61 mm)	5" (127 mm)
	3" (76 mm)	3" (76 mm)	6" (152 mm)
	4" (102 mm)	4" (102 mm)	

Ribbon Considerations

Table 1-7. Ribbon Specifications

*S*400 & *S*600		
Ribbon Width	Minimum	1.57" (40 mm)
	Maximum	4.5" (114 mm)
Standard Length	2:1 media to ribbon roll ratio	984’ (300 m)
	3:1 media to ribbon roll ratio	1400’ (427 m)
Core Size	Inner diameter	1.0" (25 mm)
	Outer diameter	3.2" (81 mm)

Zebra Programming Language (ZPL II)

ASCII data commands provide the following features:

- Downloadable graphics, scalable and bitmap fonts and formats (with data compression)
- Bit image data transfer and printing, including mixing of text and graphics
- Format inversion
- Mirror image printing
- Four-position field rotation (0, 90, 180, 270 degrees)
- Slew command
- Programmable quantity with print pause
- Communicates in printable ASCII characters
- Controlled via mainframe, mini, PC, or other data-entry device
- Serialized fields in-spec OCR-A and OCR-B
- UPC/EAN at nominal 100% magnification (6 dot/mm printhead only)
- (RAM and Memory Card)

Communication Interfaces

- Serial Port
  - ◊ RS-232
  - ◊ DB-9
  - ◊ Baud Rate (110, 300, 600, 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600)
  - ◊ Parity (disabled, even, odd)
  - ◊ Stop Bits (7 or 8 data bits)
  - ◊ Handshake (XON/XOFF or DTR/DSR)
  - ◊ Error Detection (on or off)
  - ◊ A null modem (crossover cable must be used to connect to a host 9-pin connector (see Figure 1-2).
  - ◊ A null modem cable must be used to connect to a host 25-pin connector (see Figure 1-2).
- Parallel Port
  - ◊ 36-pin Centronics
  - ◊ Bi-directional port
  - ◊ Parallel operation can be enabled or disabled in the firmware.
  - ◊ 8-bit Parallel Data Interface supporting IEEE 1284 bi-directional “nibble mode.”
- Ethernet
  - ◊ Thinnet and 10BaseT connectivity are available through an external connection to the parallel port.
  - ◊ IPX, LAT, NetBIOS/Net BEUI, TCP/IP protocols are supported with a data burst rate of 150 KB. HP bitronics mode is supported to provide bi-directional high speed. SNMP - compatible and supports MIB I, MIB II, and Parallel MIB as well as MPSPON: (Novell NetWare) PC console configuration utility IPX.

Communication Specifications

Serial Data Communication Interface Overview

The *S*400 and *S*600 printers have a single Data Terminal Equipment (DTE) port that supports RS-232 serial data communications. The RS-232 interface has a 9-pin DB-9S connector located at the rear of the printer.

For all RS-232 data and control input and output signals, the *S*400 and *S*600 printers follow both the Electronic Industries Association's (EIA) RS-232 and the Consultative Committee for International Telephony and Telegraphy (CCITT) V.24 specifications.

Standard Serial Communication Connector

Refer to Figure 1-2. The DTE Port is a DB-9P connector located at the rear of the printer. It provides connection to a host via RS-232 signaling. The pinouts and signal descriptions for the DTE port are found in Table 1-8.

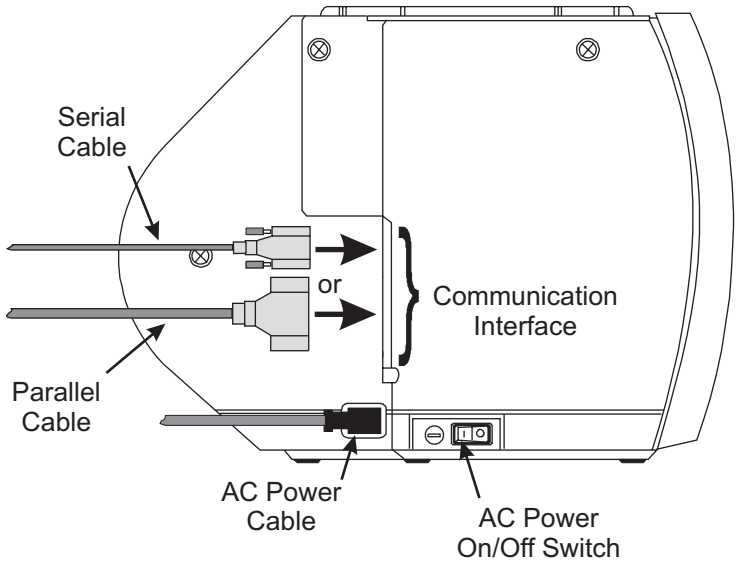

Figure 1-2. Communication Cable Connections

RS-232 Interconnection

The printer is configured as Data Terminal Equipment (DTE). Figure 1-3 illustrates the connections required to interconnect the printer with the 9-pin or 25-pin serial port connector on a PC.

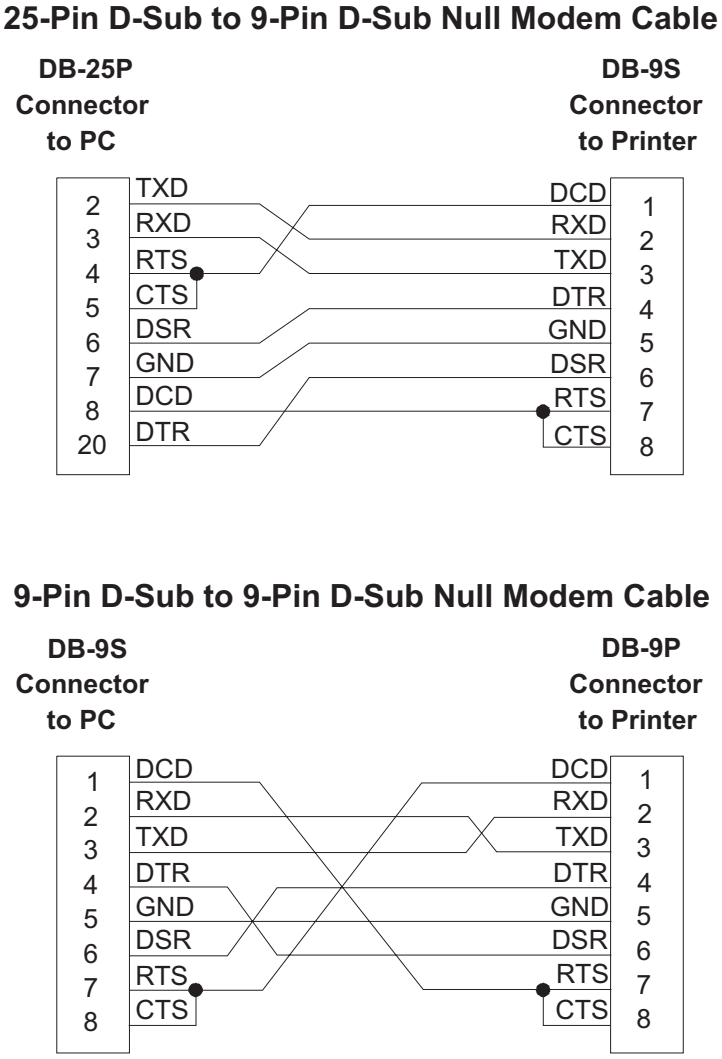

Figure 1-3. RS-232 Connections

Table 1-8. DB-9P Pinouts

Pin	Description
1	Not used.
2	RXD (RS-232 Receive Data): This is the serial data input to the printer from the host.
3	TXD (RS-232 Transmit Data): This lead is the serial data output from the printer. It is on this lead that printer status or XON-XOFF information is relayed to the host.
4	DTR (RS-232 Data Terminal Ready): This lead is a control output from the printer to the host. When the DTR control line from the printer is active (positive voltage), the host can send data to the printer. When DTR is inactive (negative voltage), the host cannot send data to the printer. This condition occurs when the printer is configured for DTR/DSR hardware handshaking and the communication buffer is within 256 characters of its capacity.
5	Signal ground for RS-232: Not tied to frame ground. This lead serves as the voltage reference between the interfaced devices.
6	DSR (RS-232 Data Set Ready): This is a control input to the printer from the host. The printer monitors this lead to determine whether the host is ready to receive data/status from the printer.
7	RTS (RS-232 Request to Send): This is a control output from the printer to the host. RTS is active (positive voltage) when the printer is On (**I**). An active RTS indicates that the printer is ready to receive data.
8	Not used.
9	+5V Fused Output, 1 Amp Max.

Serial Communication Signal Levels

RS-232 Transmit and Receive Data

RS-232 data signals are defined as either MARK or SPACE while control signals are either On (active—positive voltage) or Off (inactive—negative voltage). Although the permitted voltage levels can range from 3 VDC to 25 VDC, both positive and negative, the levels for the *S*400 and *S*600 printers are shown in Figure 1-4.

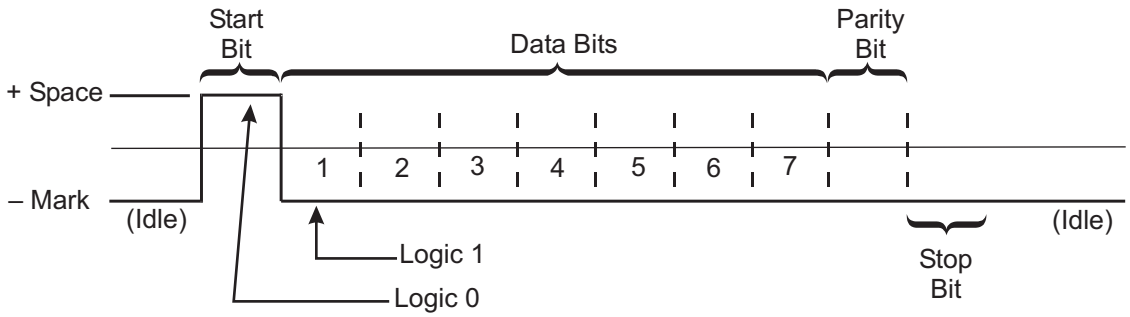

Figure 1-4. RS-232 Signal/ASCII Code Data

Centronics Parallel Data Port

The *S*400 and *S*600 printers have a standard 36-pin Centronics parallel connector (instead of a serial port) available at the rear of the printer, for connection to a parallel data source. This data communication method sends the bits of data that make up each character all at one time over several wires in the cable, one bit per wire.

Parallel Port Interconnections

Table 1-9 on page 1-13 shows the pin configuration and function of a standard PC-to-printer Centronics parallel cable.

Parallel Data Signal Levels

Parallel data signals are defined as either HIGH or LOW, while control signals are either active or inactive, meaning that some control signals are active HIGH while others are active LOW. The voltage levels that represent these conditions are:

Data Signal	Voltage Level
HIGH	+5 VDC
LOW	0 VDC

Table 1-9. Centronics Connector Pinouts

36-Pin Connector	Description
1	**STROBE** — The high to low transition of this input signal latches the data at the eight DATA inputs into the printer.
2–9	**DATA BITS** 0 through 7 — Parallel data inputs to the printer. TTL input level HIGH (+5 V) corresponds to a Logic 1; level LOW (0 V) to a Logic 0.
10	**ACKNOWLEDGE** — This printer output is an active LOW pulse indicating that the printer has received the previous character and is ready to accept another data character.
11	**BUSY** — This printer output is active HIGH whenever it cannot accept data.
12	**ERROR** — This output signal is active HIGH whenever the printer is out of paper or ribbon.
13	**SELECT** — The function of this output signal is determined by a printer configuration. In the default condition, SELECT is active HIGH whenever the parallel port is on and enabled.
14	**AUTOFEED** — Not used
15, 33, and 34	Not used
16, 19–30	**SIGNAL GROUNDS** — The logic grounds and returns for all input and output signals.
17	Chassis ground (for cable shield connection)
18	+5V fused output, 1 amp max.
31	**INITIALIZE (Reset)** — Not used
32	**FAULT** — This printer output is active LOW whenever any of the following error conditions are present: Head Open, Head Too Hot, Paper Out, Ribbon Out, or Rewind Full (if optional rewind is used).
35	+5V resistive.
36	**SEL IN** — Connected but not used.

Electronics System Block Diagram

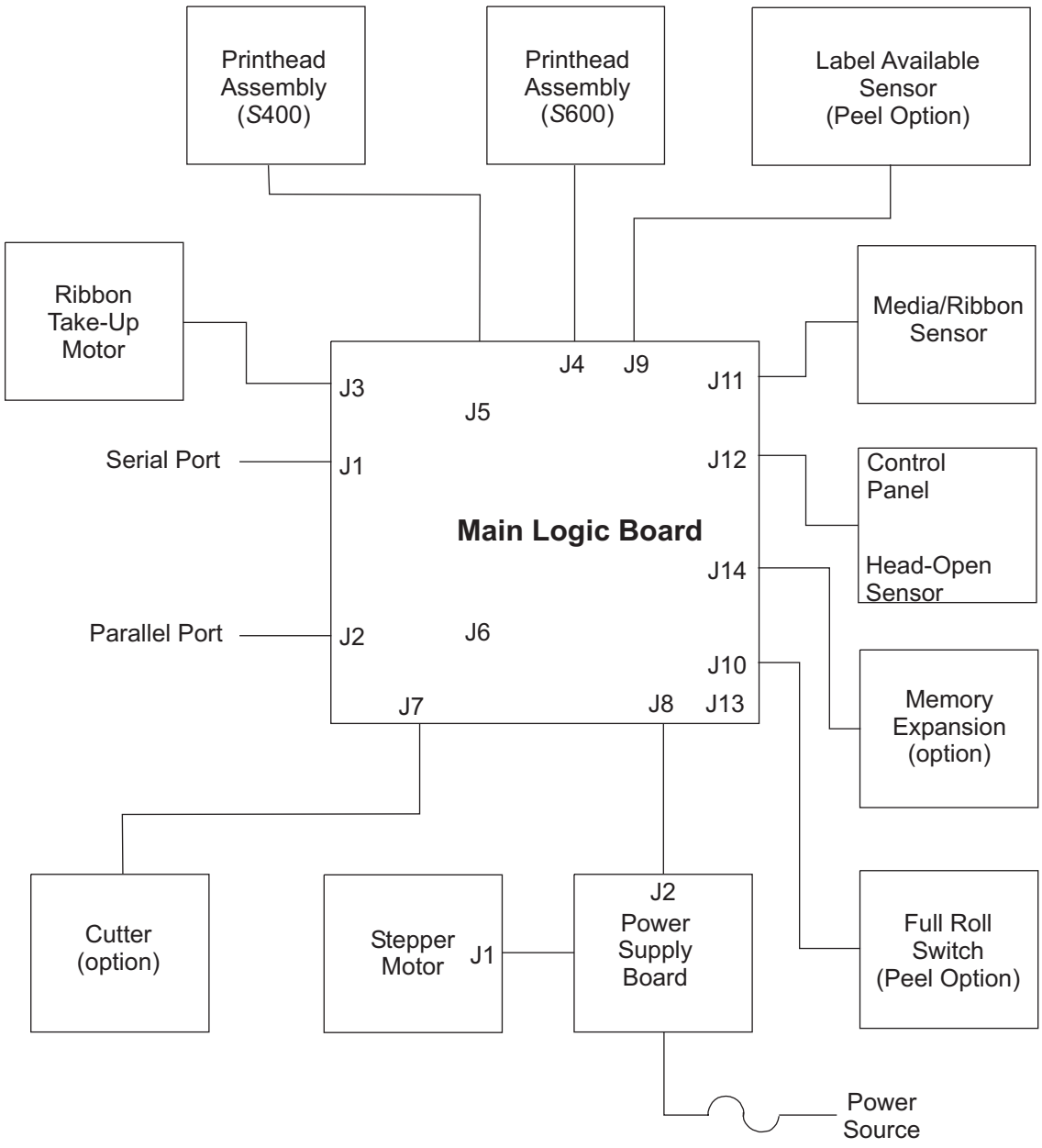

Figure 1-5. Electronic Block Diagram

Section 2
Operations Overview

This section contains information and adjustments for becoming acquainted with, adjusting, testing, and operating the printer. This information is also found in the User's Guide.

Operator Indicators

Refer to Figure 2-1.

Power Status Indicator (green)

Refer to Figure 2-2. Controlled by the power on/off (**I/O**) switch located on the left side near the AC power cord.	
On	Primary power is applied to the printer.
Off	Printer has been turned off or is not receiving power.

Printhead Status Indicator (yellow)

On	A printhead over-temperature condition exists. Printing stops until the printhead cools, then printing resumes automatically.
	A printhead under-temperature condition exists. Printing continues.
Off	Normal condition.
Flashing	The printhead is open.

Paper/Ribbon Status Indicator (yellow)

On	Media is out.
Off	Normal condition. Media and ribbon (if used) are properly loaded.
Flashing	Direct Thermal Mode — Ribbon is in printer.
	Thermal Transfer Mode — Ribbon is out.
	Peel-Off Mode — Liner rewind spindle full.

Pause Status Indicator (yellow)

On	Printer has stopped all printing operations.
Off	Normal condition.

Data Status Indicator (green)

On	Data processing or printing is taking place, but no data is being received.
Off	No data is being received or processed.
Single Flash	CANCEL was pressed and a format was successfully deleted from the print queue.
Flashing	Data is being received.
Slow Flashing	The printer sent a "stop transmitting" command to the host computer.

Darken Status Indicator (yellow)

On	Printer is in Configuration Mode. See “Adjusting the Printer Darkness” on page 2-26 and “Top of Label Position Adjustment” on page 2-28 for more information.
Off	Normal condition.

Position Status Indicator (yellow)

On	Printer is in Configuration Mode. See “Tear-Off Position Adjustment” on page 2-27 for more information.
Off	Normal condition.

Calibrate Status Indicator (yellow)

On	Printer is in Configuration Mode. See “Top of Label Position Adjustment” on page 2-28 for more information.
Off	Normal condition.

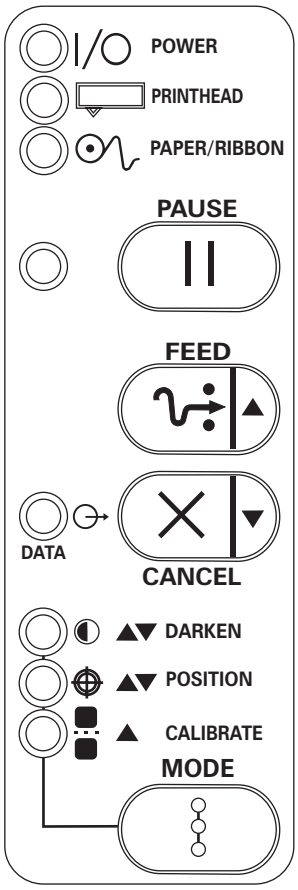

Figure 2-1. Front Panel

Operator Controls

Pause Key

Allows the operator to interrupt the printing of a batch of labels.

If Pause is pressed during printing, printing stops after completing the label being printed. If the printer is not printing, no printing can occur.

Feed (▲) Key

Forces the printer to feed one blank label.

- If FEED is pressed during printing, a blank label feeds after the current batch of labels is completed.
- If the printer is not printing, a blank label feeds immediately.

Cancel (▼) Key

When in Pause Mode, this key cancels print jobs.

- If there are no print jobs in queue, pressing CANCEL cancels the next print job to be sent to the printer.
- If there is one print job in the queue, pressing CANCEL once cancels the current print job.
- If there is more than one print job in the queue, pressing and holding CANCEL for several seconds cancels all print jobs in memory.

Mode Key

MODE puts the printer in Configuration Mode (for more information see “Configuration Mode” on page 2-23) and activates the automatic media calibration procedure.

Power ON/OFF Switch

Refer to Figure 2-2. On the left side of the printer, near the AC power cord, is the power On/Off switch. Turn the power Off (**O**) before connecting or disconnecting any cables.

Turning the switch On (**I**) activates the printer and it performs a Power-On Self Test as it begins operation. Turning the printer power On (**I**) while holding down certain front panel keys launches additional printer self tests immediately following the Power-On Self Test. These tests are described later in this section.

External influences such as lightning storms or unwanted noise on the power or data cables may cause erratic printer behavior. Turning the AC power Off (**O**) and back On (**I**) may reestablish proper printer operation.

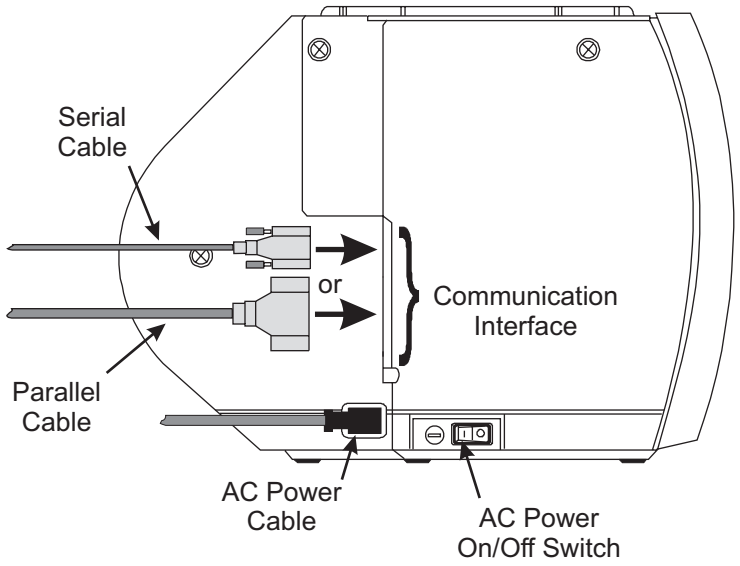

Figure 2-2. Power-On/Off Switch and Data Cable Connections

Accessing the Printer

To access the printer for loading and unloading media and ribbon, and for operator adjustments, do the following:

1. Refer to Figure 2-3. Lift the main door and swing it up and to the left until it rests on top of the right side cover.
2. Grasp the tab on top of the front door and carefully pull down until it rests on the desktop.

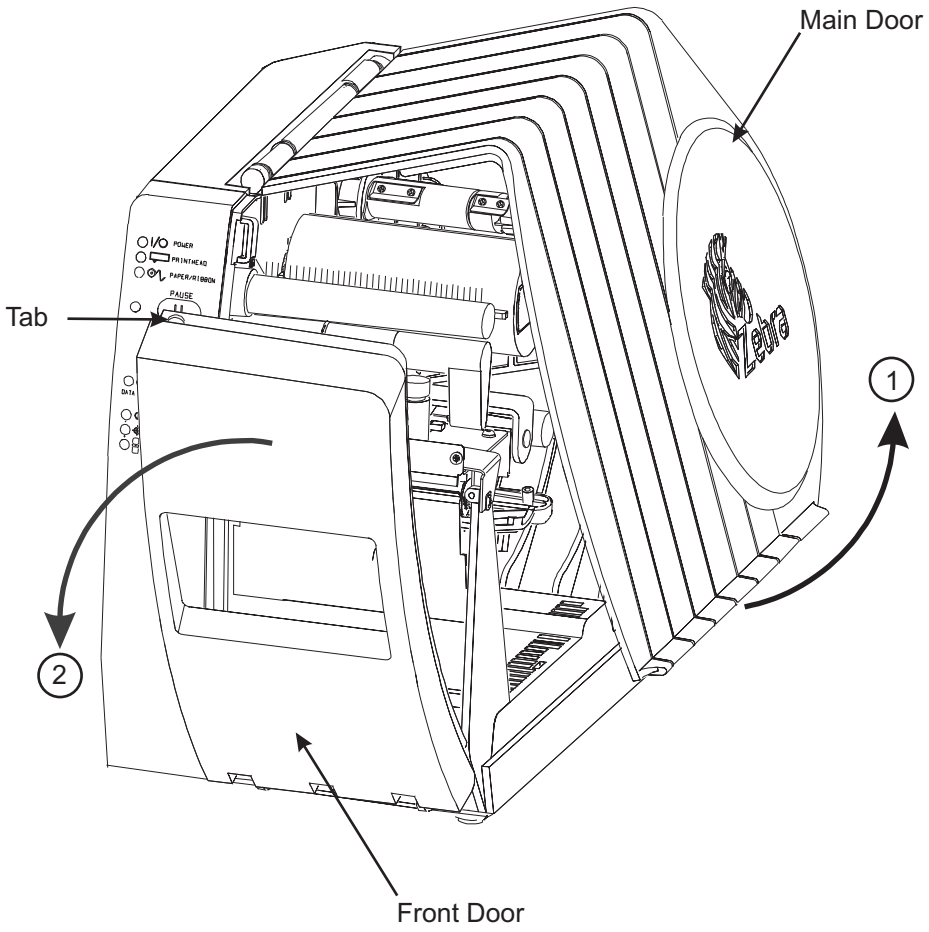

Figure 2-3. Printer Access

Media Loading

Note • Media widths and thickness vary between applications. To maintain print quality from one application to another, refer to “Configuration Mode” on page 2-23.

Tear-Off Mode Media Loading

1. Turn the head-open lever counterclockwise to the OPEN position and raise the printhead.
2. Slide the media guide and the media supply guide as far out from the printer frame as possible.
3. **Roll Media** — place the media roll on the media supply hanger and thread the media through the printhead assembly as shown in Figure 2-4.
4. **Fanfold Media** — feed fanfold media through either the bottom or rear access slot of the printer as shown in Figure 2-5.
5. Adjust the media supply guide and media guide against the outer edge of the media.

Note • These guides must not cause pressure or excessive drag on the media.

6. Close the head-open lever.
7. Perform the media sensor position adjustment.

Cutter Mode Media Loading

1. Turn the head-open lever counterclockwise to the OPEN position and raise the printhead.
2. Slide the media guide and the media supply guide as far out from the printer frame as possible.
3. Place the media roll on the media supply hanger and thread the media through the printhead assembly as shown in Figure 2-6.

Note • The end of the media must be positioned on top of the platen roller.

4. Adjust the media supply guide and media guide against the outer edge of the media.

Note • These guides must not cause pressure or excessive drag on the media.

5. With the end of the media positioned directly on top of the platen roller, close the head-open lever. The printer automatically feeds out and cuts one label when power is turned On (**I**).
6. Perform the media sensor position adjustment.

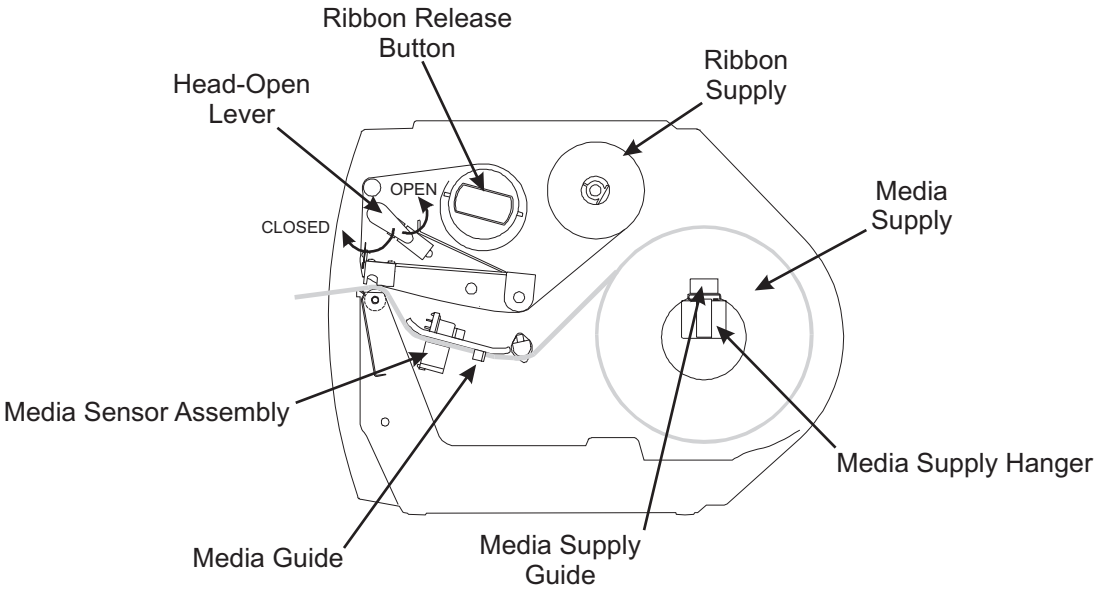

Figure 2-4. Roll Media Loading

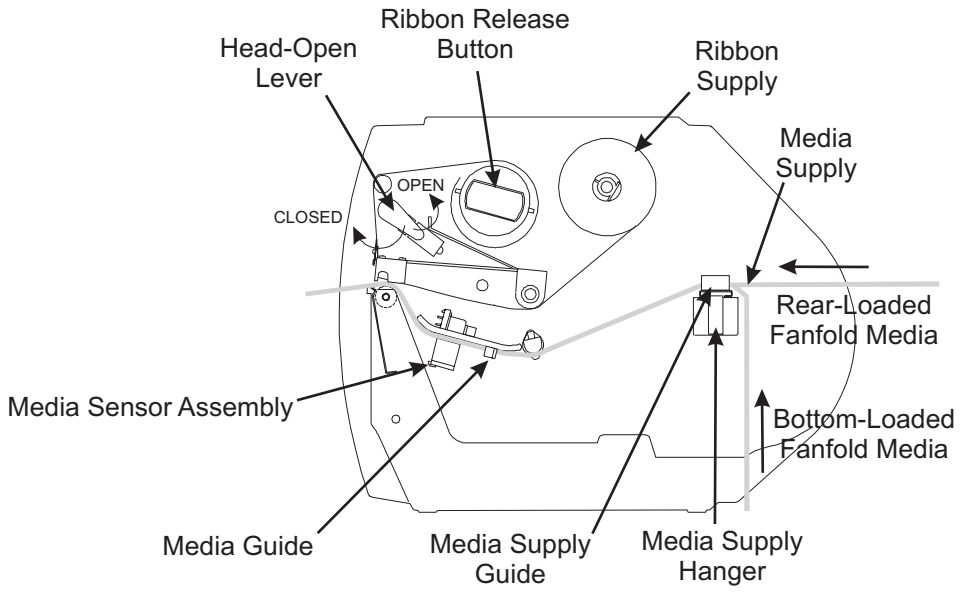

Figure 2-5. Fanfold Media Loading

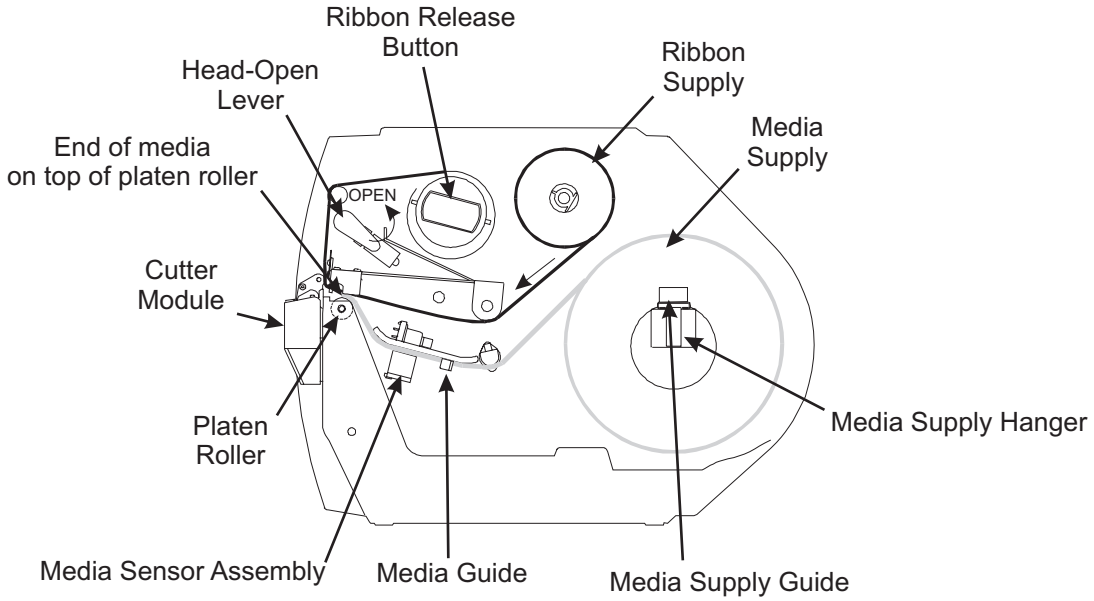

Figure 2-6. Cutter Mode Media Loading

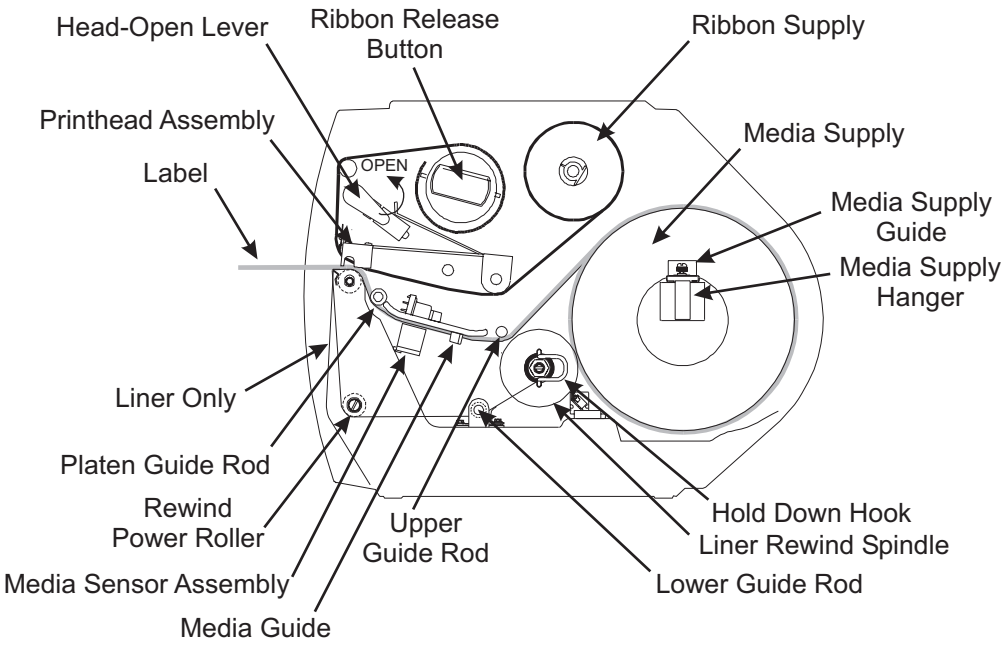

Figure 2-7. Peel-Off Mode Media Loading

Peel-Off Mode Media Loading

1. Turn the head-open lever counterclockwise to the OPEN position and raise the printhead.
2. Slide the media guide and the media supply guide as far out from the printer frame as possible.
3. Remove the hold down hook.
4. Place the media roll on the media supply hanger and thread the media through the printhead assembly as shown in Figure 2-7.
5. From the front of the printer, pull the media through the printhead assembly until approximately 24 in. (61 cm) of media extends out from the printer. Remove the labels from the liner.
6. Thread the liner behind the lower label available sensor through the slot under the rewind power roller and below the lower guide rod to the liner rewind spindle.
7. Wind the liner counterclockwise three or four times around the liner rewind spindle. Ensure the edge of the liner material is against the round plate at the far end of the spindle.
8. Place the hold down hook over the liner and insert both ends into the small slots in the round plate at the far end of the spindle. Rotate the liner rewind spindle counterclockwise to remove any slack in the liner.
9. Adjust the media supply guide inward until it is just touching the outer side of the media supply roll. Lock the guide in place with the locking screw.
10. Adjust the outer edge guides on the lower guide rod and the platen guide rod until they just touch the outer edge of the media and liner without causing the material to buckle.
11. Adjust the media guide until it just touches the outer edge of the media and liner without causing the material to buckle.
12. Close the head-open lever.
13. Refer to “Adjusting the Media Sensor” on page 2-10 and perform the media sensor position adjustment.

Removing the Liner

When the amount of liner wound on the liner rewind spindle reaches full capacity, the liner rewind spindle full sensor activates, the Paper/Ribbon LED flashes, and printing pauses.

Use the following steps to remove the liner.

Note • You do not need to turn the printer Off (O) for this procedure.

1. Unwind about 24 in (61 cm). of liner from the liner rewind spindle and cut it off at the spindle.
2. Pull out the hold down hook and slide the liner off of the spindle and discard.
3. Feed the new starting edge of the liner through the mechanism and attach it to the liner rewind spindle as described in “Peel-Off Mode Media Loading” on page 2-9.
4. While holding the media in position against the tear-off/peel-off plate, open and close the printhead without disturbing the media position. The printer is now ready to print more labels.

Adjusting the Media Sensor

Refer to Figure 2-8. When the printer is turned On (**I**), it performs a self test and configures its operating characteristics. Some of these characteristics are determined by the position of the media sensor.

The media sensor assembly consists of two sections. The media passes between a stationary light source and a movable light sensor. The light source is positioned below the media, while the light sensor is above the media.

Media Sensor Adjustment for Non-Continuous Media

This type of media has some type of physical characteristic (web, notch, perforation, etc.) that indicates the start or end of each label.

1. Turn the head-open lever counterclockwise to the OPEN position and raise the printhead.
2. Look through the front of the print mechanism and locate the media sensor adjustment lever.
3. Reposition the sensor until the top of the adjustment lever is in line with the notch in the media.
4. Close the head-open lever.

Media Sensor Adjustment for Continuous Media

Continuous media does not contain label start or end indicators. You must tell the printer, through the software, the length of each label. If you are using ZPL or ZPL II, include a Label Length (^LL) instruction in each label format you send to the printer. Refer to your ZPL II Programming Guide or instructions provided with your software driver.

Note • When using continuous media, position the Media Sensor anywhere over the media so an “Out-of-Media” condition can still be sensed.

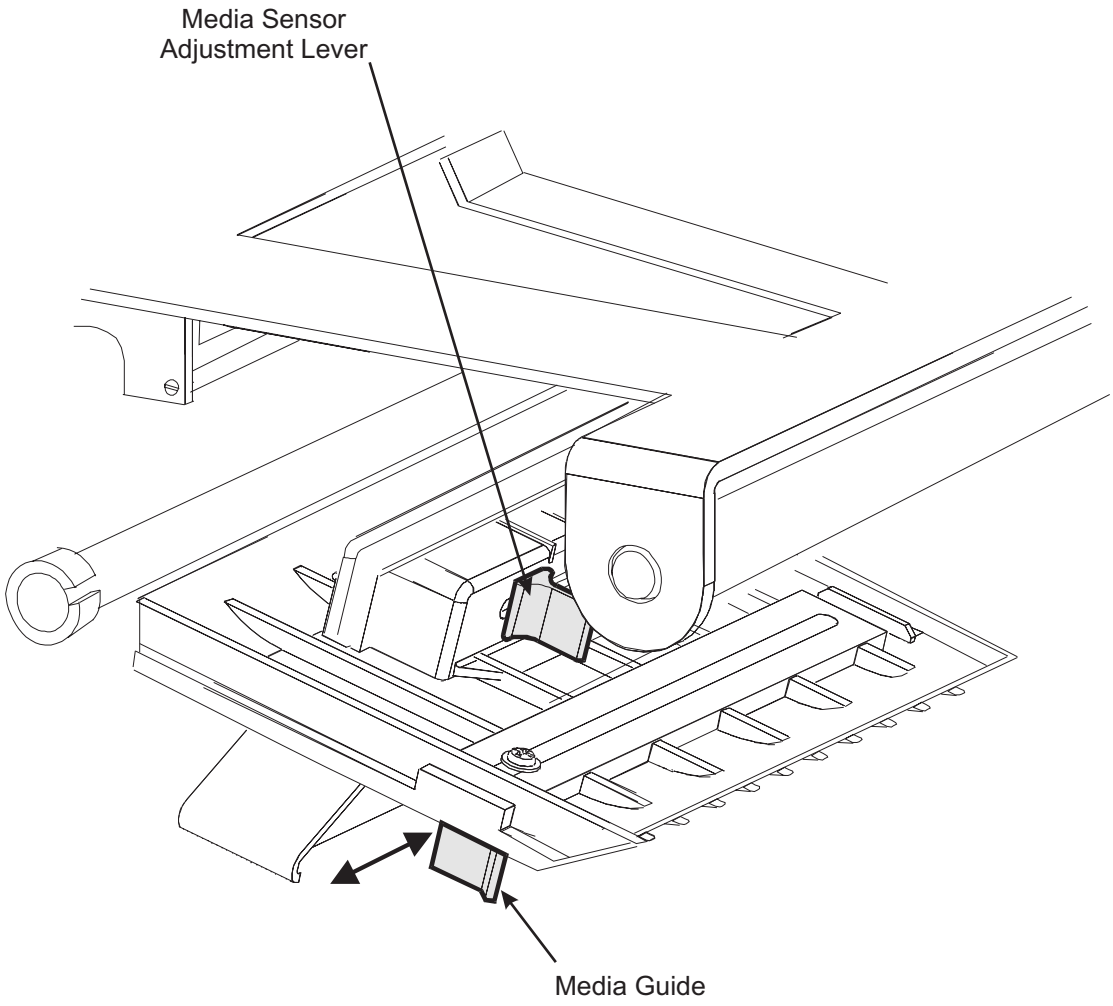

Figure 2-8. Media Sensor Adjustment

Ribbon Loading

Note • Do not load ribbon if the printer is to be used in direct thermal mode.

Caution:

Do not use ribbon that is narrower than the media. Premature printhead failure may result due to excessive abrasion caused by thermal transfer media.

Adjusting the Ribbon Supply Spindle

The *S*400/*S*600 comes with a dual-tension ribbon supply spindle to provide the appropriate amount of tension on the ribbon.

Normal Position

Refer to Figure 2-9. In the normal position, the dual-tension ribbon supply spindle provides the desired amount of ribbon back-tension for different ribbon widths. To place the spindle in the normal position, firmly pull the spindle end-cap until it clicks into place.

Low-Tension Position

The low-tension position is used in limited applications with ribbons wider than 2.4 in. (61 mm) to provide lower back-tension. The low-tension position is recommended only when normal tension hampers ribbon movement. To place the spindle in the low-tension position, firmly push the spindle end-cap until it clicks into place.

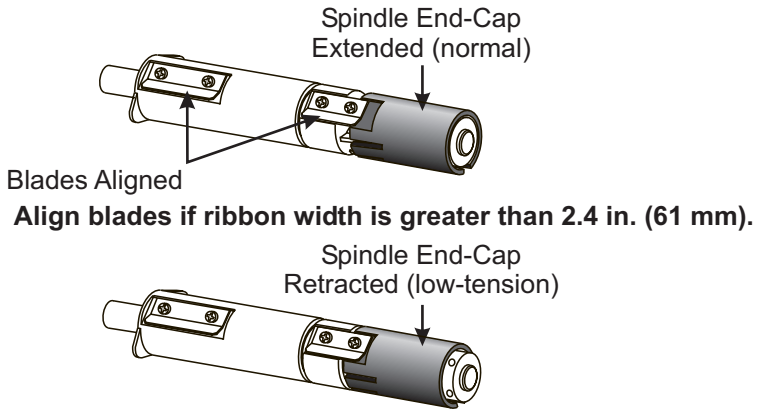

Figure 2-9. Dual-Tension Ribbon Supply Spindle Adjustment

Loading the Ribbon

Notes • For the direct thermal print method, ribbon is not used and should not be loaded in the printer when performing media calibration.

Use ribbon that is wider than the media. The smooth liner of the ribbon protects the printhead from wear and premature failure due to excessive abrasion.

Refer to Figure 2-10.

1. Adjust the ribbon supply spindle position for normal or low tension refer to "Adjusting the Ribbon Supply Spindle" on page 2-12.

Note • Step 2 can be skipped if the ribbon width is 2.4 in. (61 mm) or less.

2. Align the blades on the two sections of the spindle as shown in Figure 2-9.
3. Place the ribbon roll on the ribbon supply spindle so the ribbon unwinds toward the front of the printer from under the roll. Ensure the core is pushed against the stop and the ribbon is aligned squarely with the core.
4. Open the printhead assembly by turning the head-open lever counterclockwise to the OPEN position.
5. Thread the ribbon as shown in Figure 2-10. Do not to crease or wrinkle the ribbon. Wind the ribbon onto the ribbon take-up spindle for several turns in a clockwise direction.
6. Close the printhead assembly by turning the head-open lever clockwise to the CLOSED position.

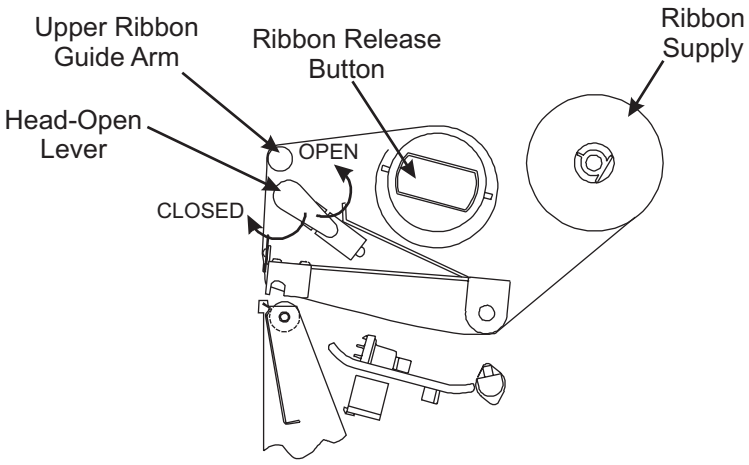

Figure 2-10. Ribbon Loading Diagram

Removing Used Ribbon

Refer to Figure 2-10.

1. Cut the ribbon between the upper ribbon guide roller and the ribbon take-up spindle.
2. Press the ribbon release button and slide the ribbon off of the ribbon take-up spindle.

Data Cable Installation

3. Turn the printer Off (**O**).
4. Determine whether you are using a parallel data cable or serial data cable.
5. Follow your computer manufacturer's instructions for installing data cables to the computer. You may need to turn off the computer before making any cable connections.
6. Refer to Figure 2-2 on page 2-4. Connect the printer data cable from the computer to the proper port on the rear of the printer.

Power-On Self Test

A Power-On Self Test is performed automatically each time the printer is turned on. This test checks for proper initialization of various electronic circuits and establishes starting parameters as those stored in the printer's memory. During this test sequence, the front panel LEDs turn on and off to ensure proper operation. Once completed, only the Power LED remains on. If other LEDs are on, refer to "Troubleshooting" on page 3-1.

Additional Printer Self Tests

These tests produce sample labels and provide specific information that helps the operator determine the operating conditions for the printer.

Each self test is enabled by pressing and holding in a specific key while turning the power switch On (**I**). Press the key until the front panel LEDs turn on. When the Power-On Self Test is complete, the selected printer self test automatically starts.

Notes • When performing self tests (except for the Mode Key Self Test), disconnect the printer data cable from the printer.

Use full-width media when performing self tests. Labels less than full width lose printing on the right side. Printing may run on to the next label when using short labels.

When canceling a self test before its completion, turn the printer power switch Off (**O**) and back On (**I**).

When performing the self tests in Peel-Off Mode, remove the labels as they become available.

When the cutter option is installed and enabled, labels printed during the self test are automatically cut as they are printed.

Printer Self Test/Reset Default Quick Reference Chart

Table 2-1 lists the self tests and default resets that can be accessed by pressing and holding a front panel key or keys and turning power on. The “X” in the four columns on the right indicates which key or keys are pressed.

The ✓ indicates that the self test is one that can be performed by the operator or maintenance personnel. These tests produce sample labels and provide specific information that helps the operator or maintenance personnel determine operating conditions for the printer. Self tests without the ✓ are for repair and maintenance of the printer and should be performed only by maintenance personnel.

Detailed information on the operator self tests immediately follows this chart. Detailed information on maintenance personnel-only self tests are found in “Preventive and Corrective Maintenance” on page 4-1 along with extended diagnostics.

Note • The printer data cable must be removed from the printer (except for the Mode Key Self Test) prior to running the self tests.

Table 2-1. Self Test and Calibration Quick Reference Chart

Operator	Description	Pause	Feed	Cancel	Mode
✓	**Cancel Key Self Test** — Produces a printer configuration label printout			X	
✓	**Pause Key Self Test** — Produces test printouts for adjustments (15 or 50 labels @ 2 or 6 ips)	X			
✓	**Feed Key Self Test** — Produces test printouts to determine the best darkness setting		X		
✓	**Mode Key Self Test** — Produces a Communications Diagnostic Mode printout				X
✓	**Factory Default Reset** — Resets printer configuration to factory default values	X	X		
✓	**Communication Parameter Default Reset** — Resets printer communication parameters to 9600 baud, 8 bit work length, no parity, and 1 stop bit	X	X		X
✓	**Manual Calibration** — Determines media type, label length, media and ribbon sensor settings, and printing method	X	X	X	
	Pause and Cancel Key Self Test — Serialized test printouts that verify proper printer operation (500 maximum)	X		X	
	Ribbon Parameter Calibration — Sets ribbon parameters to factory default values.		X	X	X
Note • This test is performed only when sensor assemblies are replaced or when a manual calibration fails. A Manual Calibration must be performed after the Ribbon Parameter Calibration.					
	Feed and Cancel Key Self Test — Preprograms label test formats for major overhauls		X	X	

Cancel Key Self Test

Refer to Figure 2-11. This self test prints a listing of the printer's configuration parameters stored in configuration (EEPROM) memory.

Configuration can be changed temporarily (for specific label formats or ribbon and label stock) or permanently (by saving the new parameters in memory). Saving new parameters occurs whenever a printer configuration procedure is performed.

To start the Cancel Key Self Test, press CANCEL while turning the power on. The printer first runs through a Power-On Self Test, then prints the configuration label.

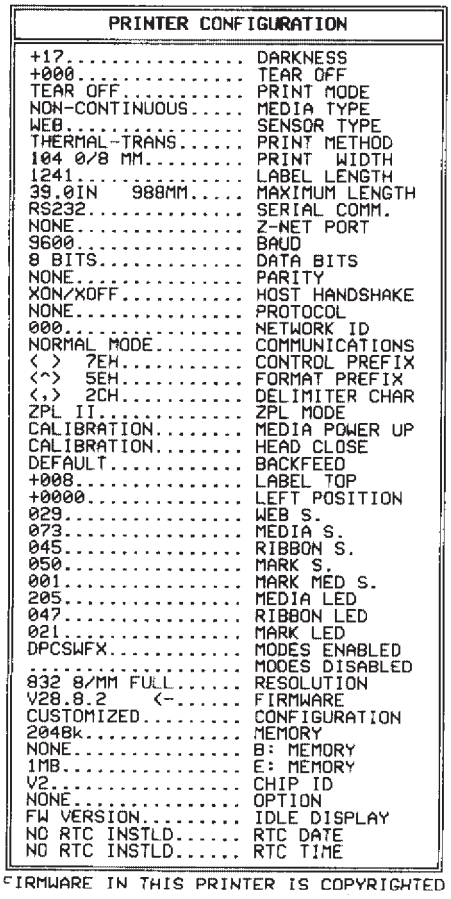

Figure 2-11. Cancel Key Self Test Printout (Configuration Label)

Pause Key Self Test

Refer to Figure 2-12.

This self test can be used to provide the test labels for making adjustments to the printer's mechanical assemblies and Configuration Mode adjustments.

To start the Pause Key Self Test, press and hold PAUSE while turning the power On (**I**). This self test consists of four individual test features:

- The initial self test prints 15 labels at 2 in. (50.8 mm) per second (ips) (speed A), then automatically pauses the printer. Each time PAUSE is pressed, an additional 15 labels print, up to a maximum of 9999 labels.
- While the printer is paused, pressing CANCEL once alters the self test. Now each time PAUSE is pressed, 15 labels print at 6 ips (152.4 mm) (speed D), up to a maximum of 9999 labels.
- While the printer is paused, pressing CANCEL a second time alters the self test again. Now each time PAUSE is pressed, 50 labels print at 2 ips (50.8 mm), up to a maximum of 9999 labels.
- While the printer is paused, pressing CANCEL a third time alters the self test again. Now each time PAUSE is pressed, 50 labels print at 6 ips (152.4 mm), up to a maximum of 9999 labels.

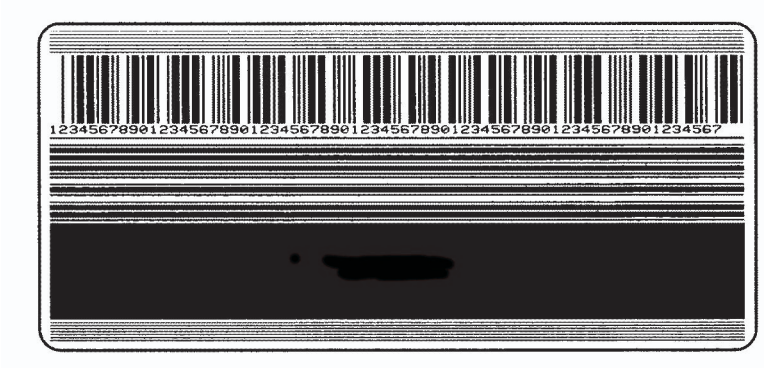

Figure 2-12. Pause Key Self Test Printout

Feed Key Self Test

The results of this self test determine the best darkness setting for a specific media and ribbon combination.

Refer to Figure 2-13.

The Feed Key Self Test prints a series of labels at various plus or minus darkness settings relative to the current darkness setting. The operator inspects these printouts and determines which printout has the best darkness setting. The value next to Relative Darkness on the printout is added to (+) or subtracted from (–) the current darkness value.

The following procedure sets the darkness of the printing on the label. To start the Feed Key Self Test, press and hold FEED while turning the power On (**I**).

Note • To maximize the life of the printhead, use the lowest setting that provides the necessary print quality.

1. Press MODE. The pause and darken LEDs turn on.
2. If the Feed Key Self Test produces a positive value, press FEED (▲) the number of times indicated on the printout.

Example • If the best label has Relative Darkness: 3, press FEED three times.

3. If the value on the Feed Key Self Test printout is a negative value, press CANCEL (▼) the number of times indicated on the printout.

Example • If the best label has Relative Darkness: –2, press CANCEL twice.

4. Press MODE three times. The mode LEDs flash to indicate the settings have been saved to memory.
5. Press PAUSE to exit Pause Mode and turn off the pause LED.

Figure 2-13. Feed Key Self Test Printout

Mode Key Self Test

Note • The printer data cable must be connected to the host computer during this self test.

Refer to Figure 2-14. This self test places the printer in a Communications Diagnostics Mode, in which the printer prints the ASCII characters and their corresponding hexadecimal values for any data received from the host computer.

To start the Mode Key Self Test, press and hold MODE while turning the power On (**I**).

Feed and Pause Key Factory Default Reset

If it is ever necessary to return the printer configuration to factory default values, press FEED and PAUSE at the same time while turning the power On (**I**). The default values remain active until the power is turned off. To save the default values in memory, press MODE four times. The darken, position, and calibrate LEDs cycle on and then off, indicating the values have been saved. Refer to Table 2-2 for a list of factory default values.

Feed, Pause and Mode Key Reset (Communication Parameter Default)

To reset the communication parameters only, press and hold FEED, PAUSE, and MODE while turning the power On (**I**). The communication parameters are reset to 9600 baud, 8 bit work length, no parity, and 1 stop bit.

To make these settings permanent, press MODE four times. The darken, position, and calibrate LEDs flash, indicating the changes have been saved. To return to Printing Mode, turn the power off then on.

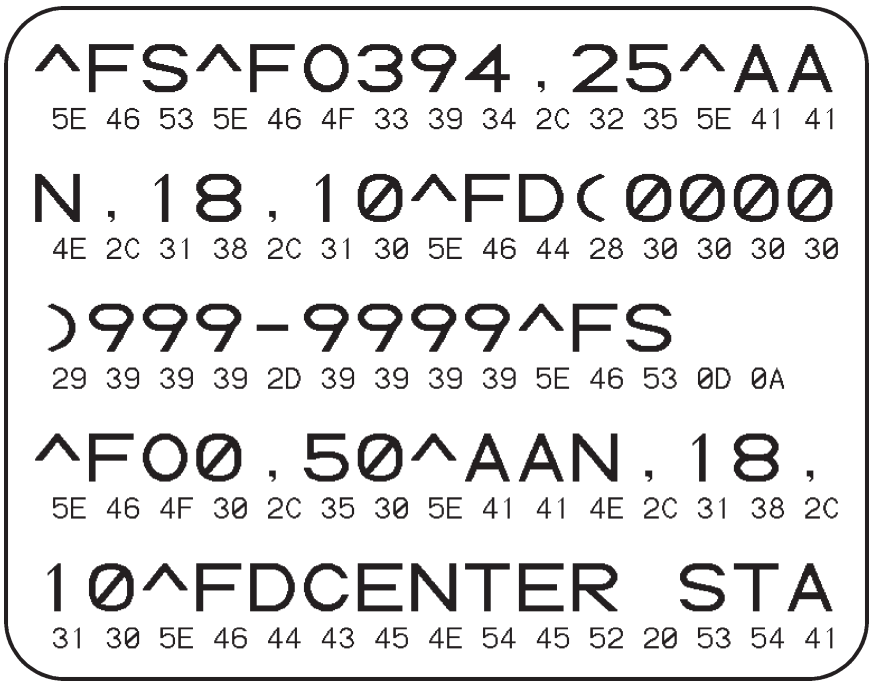

Figure 2-14. Mode Key Self Test Printout

Table 2-2. Factory Default Values

Parameter	Default Value
Backfeed	Default
Baud	9600
Calibration	Auto
Darkness	10
Data Bits	8 bits/character
Error Detection	On
Handshake	XON/XOFF
Head Close	Calibration
Label Top	00
Left Position	000
Media Type	Non-Continuous Web Sensing
Parallel Port	Enabled
Parity	None
Print Method	Thermal Transfer
Print Mode	Tear-Off
Print Width	104 mm
ZPL Control Prefix	7E
ZPL Delimiter Char	2C
ZPL Format Prefix	5E
ZPL Mode	ZPL II

Calibration

Auto Calibration

Auto calibration occurs when the printer is turned On (**I**) or when the printhead is opened and closed (with the printer turned on). During the procedure, the printer automatically determines the media type, label length, media and ribbon sensor settings, and printing method (direct thermal or thermal transfer). The procedure is set at the factory but may be changed via ZPL II command.

Note • If the printer fails to auto calibrate when you are using preprinted labels or preprinted liner, or if the printer does not auto calibrate at all, refer to "Manual Calibration" on page 2-22.

1. Load the media and ribbon.
2. Turn the printer On (**I**).
3. Several blank labels feed, completing the auto calibration procedure.

Manual Calibration

Important • Perform manual calibration when using preprinted media, when in Manual Calibration Mode, or if auto calibrate does not work.

During this procedure, the printer determines the media type, label length, media and ribbon sensor settings, and printing method. Media type is determined by sensing either continuous or non-continuous media as blank labels move through the printer. If non-continuous media is sensed, label length is also calibrated. If ribbon is sensed, the thermal transfer print method is configured. If ribbon is not sensed, the direct thermal print method is configured.

The results of the calibration are stored in the printer's memory and are retained even if power is removed. These parameters remain in effect until the next calibration is performed.

Notes • Perform this procedure only once to put the printer into manual calibration. After that, press MODE three times and FEED once when changing media (a label prints showing the sensor profile).

If the printer is in Peel-Off Mode, the operator must catch the labels as they peel away from the liner.

1. Turn printer power Off (**O**).
2. Place the head-open lever in the OPEN position.
3. Remove the ribbon.
4. Remove approximately six labels from the media roll, enough so only the liner is threaded under the media sensor.
5. Reload the media.
6. Press and hold PAUSE, FEED, and CANCEL.
7. Turn the power switch On (**I**).
8. After the calibrate LED goes out, release PAUSE, FEED, and CANCEL.
9. When the printhead LED flashes, reload the ribbon.
10. Ensure the media sensor is properly positioned.
11. Close the printhead.
12. A media and ribbon sensor profile prints.

Note • To return to auto calibration, press and hold PAUSE, CANCEL, and MODE when you turn the printer on.

Ribbon Parameter Calibration

Note • Perform this procedure only if the manual calibration fails or if sensor assemblies are replaced. A manual calibration must be performed after the ribbon parameter calibration.

To set the ribbon parameter to factory default values:

1. Turn the printer Off (**O**).
2. Open the printhead and remove the ribbon.
3. Press and hold FEED, CANCEL, and MODE while turning the power On (**I**).
4. After the printhead LED has flashed, load the ribbon.
5. Close the printhead.
6. Press MODE 4 times to save parameters.

Note • A label automatically prints, showing the ribbon sensor profile.

Configuration Mode

Configuration Mode allows you to fine-tune the internal printer configuration settings for your application. In this mode, you can change the following parameters:

- Printer darkness.
- Rest position of the media with respect to the web or inter-label gap.
- Position of printing relative to the top of the label.
- Media and ribbon sensor values.
- Label length.
- Printing method.
- Media type (continuous or non-continuous).

Create a printout of the printer configuration by performing the Cancel Key Self Test.

To set the printer configuration to factory defaults, refer to “Feed and Pause Key Factory Default Reset” on page 2-19.

The *ZPL II Programming Guide* contains information on instructions that may be sent to the printer to disable the Mode key and set specific label format values for each of these parameters. If you are not using ZPL II, refer to the instructions provided with your software to determine whether it allows you to change these parameters.

Print Darkness

Differences in types of media, ribbon, and the wear on thermal printhead elements may make it necessary to adjust the print darkness setting to achieve proper printing.

Printing and Examining a Configuration Label

First, it is a good idea to print out a configuration label to check the existing darkness setting. Also, once the ideal parameters for a particular media and ribbon combination have been determined, you can print a configuration label and save it for future reference. To get a configuration label, you can print a Cancel Key Self Test.

Refer to Figure 2-11 on page 2-16. To start the Cancel Key Self Test, press and hold CANCEL while turning the printer On (**I**). The printer runs through a Power-On Self Test, then prints the configuration label.

The first item on the configuration label is the darkness setting. It is displayed as a number between 0 and 30. The sample shown in Figure 2-11 on page 2-16 lists as darkness setting of 20. The factory default for this value is 10.

If you already know the darkness setting for a particular combination of media and ribbon, you may skip to “Adjusting the Printer Darkness” on page 2-26.

Note • Use full width media when performing the self tests. Labels less than full width lose printing on the right side. Printing may run on to the next label when using short labels.

Testing Print Darkness (Feed Key Self Test Method)

Refer to Figure 2-11 on page 2-16.

The Feed Key Self Test prints a series of labels at various plus or minus darkness settings relative to the current darkness setting and at various print speeds. Inspect these printouts to determine which printout has the best darkness setting. The value next to Relative Darkness: on the printout is added to (+) or subtracted from (–) the current darkness value. If the label with the best appearance has a value of “ØØ,” no adjustments are necessary.

To start the Feed Key Self Test, press and hold FEED while turning the power On (**I**). The printer runs through a Power-On Self Test, then starts printing the Feed Key Self Test labels. Examine the labels and proceed to “Adjusting the Printer Darkness” on page 2-26.

Testing Print Darkness (Pause Key Self Test Method)

Another method of testing print darkness, with a test label that contains a large amount of printing, is performed with the Pause Key Self Test. First, you must determine how you want to proceed with the adjustments.

1. You can run the Pause Key Self Test without knowing your current darkness setting. You can run the test, examine the labels, and then perform the procedure “Adjusting the Printer Darkness” on page 2-26 using your best guess as to how far to increase or decrease the setting to the optimal setting.
2. You can set the darkness to the factory default value or anything you wish, then run the Pause Key Self Test, and then perform the procedure “Adjusting the Printer Darkness” on page 2-26.

To Set Darkness Setting Manually

1. Press MODE. The pause and darken LEDs come on.
2. Press and release CANCEL (▼) to decrease the setting, each time waiting for the darken LED to flash once before pressing again. Continue to press CANCEL (▼) until the LED does not flash. This means you are at setting “0.”
3. Press and release FEED (▲) to increase the setting, each time waiting for the LED to flash once before pressing again. Continue to press FEED (▲) until you count up to 10 (factory default) or to your desired setting.
4. Press MODE three times. The mode LEDs will flash to indicate that the settings have been saved permanently to memory.
5. Press PAUSE to resume printing. You are now ready to start the Pause Key Self Test.

To Start the Pause Key Self Test

Press and hold PAUSE while turning the printer On (**I**). This self test consists of four individual test features:

- The initial self test prints 15 labels at 2 in. (50.8 mm) per second (ips) (speed A), then automatically pauses the printer. Each time PAUSE is pressed, an additional 15 labels print, up to a maximum of 9999 labels.
- While the printer is paused, pressing CANCEL once alters the self test. Now each time PAUSE is pressed,15 labels print at 6 (152.4 mm) ips (speed D) up to a maximum of 9999 labels.
- While the printer is paused, pressing CANCEL a second time alters the self test again. Now each time PAUSE is pressed, 50 labels print at 2 (50.8 mm) ips, up to a maximum of 9999 labels.
- While the printer is paused, pressing CANCEL a third time alters the self test again. Now each time PAUSE is pressed, 50 labels print at 6 (152.4) ips up to a maximum of 9999 labels.
- To conserve labels, check the sample labels in tests 1 or 2 of the Pause Key Self Test. If you are not satisfied with the print darkness quality, proceed to “Adjusting the Printer Darkness” on page 2-26 and adjust accordingly.

Run test 1 or 2 of the Pause Key Self Test and repeat the procedures if the desired print darkness is still not achieved.

Adjusting the Printer Darkness

Caution:

Set Print Darkness to the lowest setting possible for desired print quality. Darkness set too high may cause ink smearing, ribbon wrinkle, or ribbon burning.

The following procedure sets the darkness of the printing on the label.

Note • It is not necessary to turn the printer power off to adjust this parameter.

1. Press MODE. The pause and darken LEDs turn on.
2. Press FEED (▲) to increase or CANCEL (▼) to decrease the darkness setting.

   Refer to Figure 2-11 on page 2-16.

Example 1 • The configuration label lists a darkness setting 20. You know your media and ribbon combination should be 15. Press CANCEL (▼) five times.

Refer to Figure 2-13.

Example 2 • After running the Feed Key Self Test, you have determined that the label that looks the best has a relative darkness of 03. Press FEED (▲) three times.

Example 3 • After manually resetting the darkness to the factory default of 10, you run the Pause Key Self Test and determine the labels are too light. Make your best estimate and press FEED (▲) the necessary number of times.

3. Press MODE three times. The mode LEDs flash to indicate the settings have been saved permanently to memory.
4. Press PAUSE to exit Pause Mode and turn off the pause LED.

Tear-Off Position Adjustment

Refer to Figure 2-15.

This procedure sets the end-of-label position relative to the tear-off plate or cutter. The media stopping position is adjustable in increments of four dot rows at a time. The possible adjustment range is ± 80 dot rows or a distance of 0.392 in. (10 mm) up or down from the center. Adjust if the label is not being torn or cut at the correct position.

1. Press MODE twice. The pause and position LEDs turn on.
2. To adjust the label position, press FEED (▲) to move the label forward (out of the printer) or CANCEL (▼) to move the label back (into the printer).
3. Press MODE twice. The mode LEDs flash to indicate that the settings have been saved to memory.
4. Press PAUSE to exit Pause Mode and turn off the pause LED.

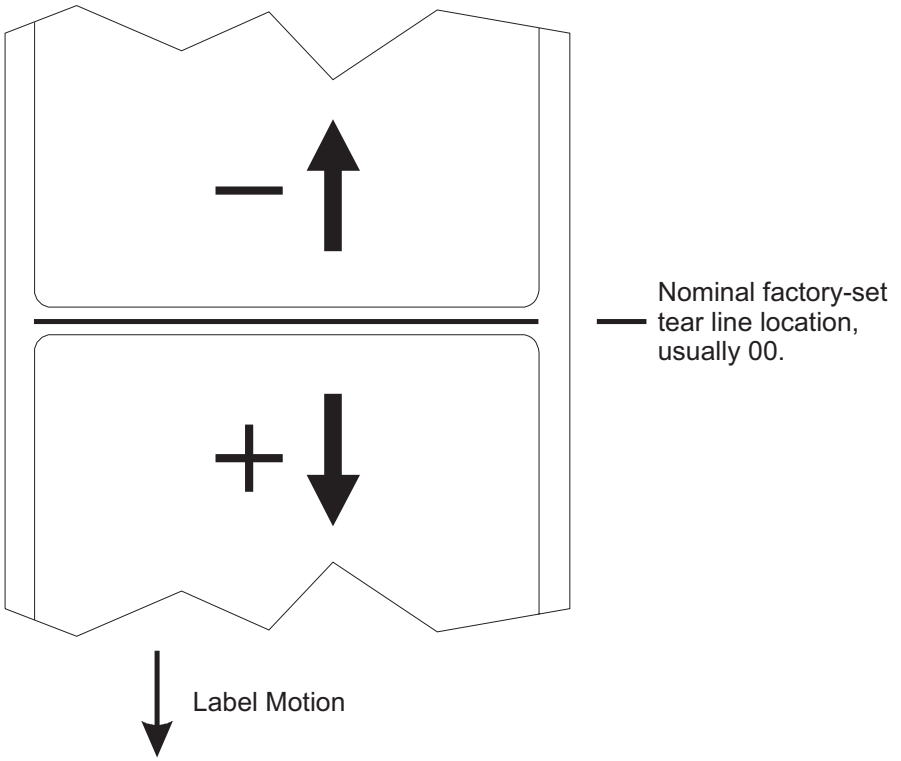

Figure 2-15. Tear-Off Position Adjustment

Top of Label Position Adjustment

This procedure positions the printing on the label relative to the top edge of the label. Adjust if the printing is too close or too far away from the top or bottom edge of the label.

1. Press MODE twice briefly and then press and hold it for approximately five seconds (until the pause, darken, and calibrate LEDs turn on).
2. Press FEED (▲) to move the printing closer to the top edge or CANCEL (▼) to move away from the top edge. Each press of either of these keys equals eight dot rows, or approximately 0.0394 in.
3. Press MODE twice. The mode LEDs will flash to indicate that the settings have been saved to memory.
4. Press PAUSE to exit the Pause Mode and turn off the pause LED.

Example • In Figure 2-16, the configuration label printed on the right was printed first. It was decided to move the print closer to the top edge (in the "–" direction) approximately 15/32 in. (11 mm).

Notice that the label top line (of the configuration label on the right) has a value of +012.

Divided 15/32 in. (11 mm) by 0.0394 in. (.925 mm) = 11.89 (round to 12). Press CANCEL (▼) 12 times (completing the adjustment procedures) will give us the configuration label shown on the left when you print a new configuration label.)

The printed configuration label on the left has a LABEL TOP line value of –084 and the printing is closer to the top of the label (approximately 15/32 in. (11 mm) from its original position).

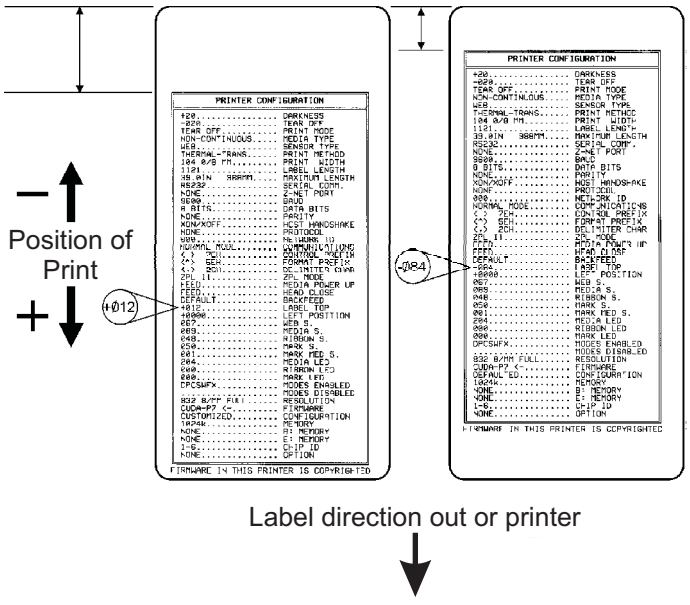

Figure 2-16. Adjusting the Print of the Top of Label

Routine Adjustments

Printhead Pressure Adjustment

If the printing is too light on one side of the label, or if a different thickness of media is used, the printhead pressure may need to be adjusted to provide the best print quality.

Refer to Figure 2-17 and perform the following procedure:

1. Begin by performing a Pause Key Self Test.
2. After printing a few labels, press PAUSE and check the print quality.
3. If necessary, increase or decrease the toggle pressure using the knurled adjustment nuts at the top of the toggle shafts.

Example 1 • If printing is acceptable on the left side, but too light on the right, increase the toggle pressure by turning the right toggle pressure knob clockwise.

Example 2 • If printing is acceptable on the right side, but too dark on the left, decrease the toggle pressure by turning the left toggle pressure knob counterclockwise.

4. Press PAUSE to continue printing and check for proper print quality.
5. Repeat steps 2 through 4 as needed.

Notes • Using the lowest pressure that produces the desired print quality can extend printhead life. Do not increase overall head pressure to increase darkness unless the continued increase of the darkness setting does not provide satisfactory results.

When using narrow media, adjust the toggle pressure knob that is away from the side frame to zero or the minimum required for acceptable print. This reduces the wear on those areas of the printhead and the platen where ribbon and media are not present.

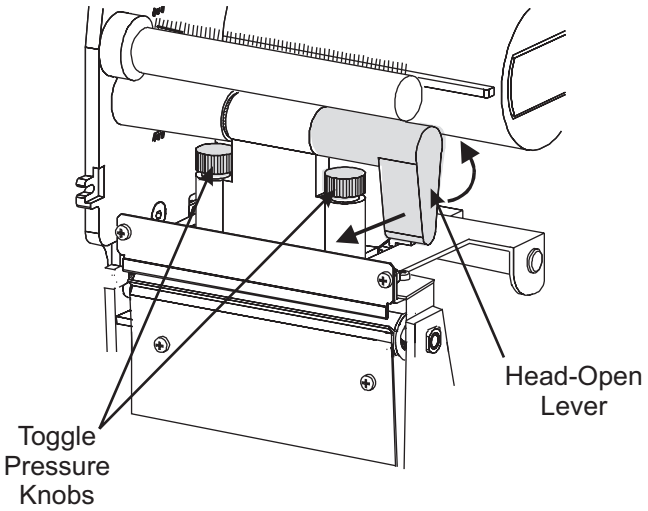

Figure 2-17. Printhead Pressure Adjustment

Liner Rewind Power Roller Adjustment

Note • The rewind power roller is present only on printers with the Peel-Off Option. This roller is pre-set during manufacture for proper operation with most applications. Adjust this roller only when necessary.

In Peel-Off Mode, proper media tracking is critical. The rewind power roller automatically turns along with the movement of media to ensure continuous rewind of the liner. When adjusting this roller, the operating position may vary due to the type, width, and thickness of the liner.

Before performing this adjustment, review the procedures in "Media Loading" on page 2-6. Ensure minimal sideways movement during the printing process by positioning the left edge of the liner even with the edge guide mark on the tear-off/peel-off plate. Position the outer media guides against the outside edge of the media, but no so tight as to bind the material.

When the rewind power roller is properly adjusted, the liner should have even tension across its entire width and be wrapped snugly around all guides and rollers. If the tension is not even, the liner may slide (walk) to the left or the right as printing occurs. This can cause print registration problems on the labels.

Note • Balancing the tension increases the reliability of the printer to provide properly printed labels by preventing the liner from walking.

Adjusting the Rewind Power Roller

1. Refer to Figure 2-18. Locate the power roller adjustment screw.
2. Use a screwdriver to turn the power roller adjustment screw **counterclockwise** to **increase** the tension on the right side of the rewind power roller. Turn the power roller adjustment screw **clockwise** to **decrease** the tension on the right side of the rewind power roller.

Note • The adjustment changes the position of the right end of the rewind power roller only. The left end remains stationary.

3. Use the Feed Key Self Test to print several labels to ensure tracking is maintained and tension on both edges of the liner remains consistent. Remember to remove each label as it is automatically peeled away from the liner.

Example 1 • Figure 2-18 illustrates an improperly adjusted rewind power roller. On the left side, the liner is not contacting the rewind power roller. This is because the liner has more tension on the right edge than on the left.

By turning the power roller adjustment screw clockwise, the tension in the right side decreases. Adjust screw until the tension is equal on the left and right sides of the rewind power roller and the liner tracking is maintained.

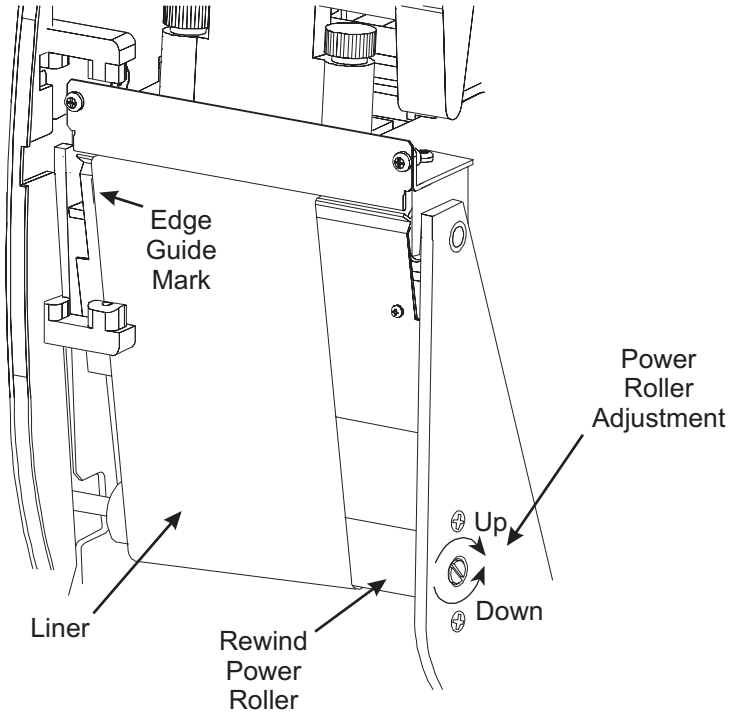

Figure 2-18. Liner Rewind Power Roller

Zebra

Section 3
Troubleshooting

Troubleshooting Charts

Consult the following charts when troubleshooting the printer.

List of Tables

Table 3-1. LED Quick Reference Chart 3-2
Table 3-2. Troubleshooting Chart (Problems with LED Indications) 3-3
Table 3-3. Troubleshooting Chart (Print or Print Quality Related Problems) 3-6
Table 3-4. Troubleshooting Chart (Wrinkled Ribbon) 3-8
Table 3-5. Troubleshooting Chart (Jammed or Stuck Labels) 3-8
Table 3-6. Troubleshooting Chart (Settings or Parameter Related) 3-9
Table 3-7. Troubleshooting Chart (Cutter Related) 3-9
Table 3-8. Explanation of Sensors 3-10

LED Quick Reference Chart

Table 3-1 is a quick reference troubleshooting chart based on the status of the LEDs after the Power-On Self Test has been completed (or attempts to complete) or during printer operation. Using the legend at the bottom of the table, match the LED condition of the printer to the chart. The rightmost column refers to possible solutions found in "Troubleshooting Chart (Problems with LED Indications)" on page 3-3.

Table 3-1. LED Quick Reference Chart

Power	Printhead	Paper/ Ribbon	Pause	Data	Darken	Position	Calibrate	Refer to Table 3-2 Item #
●	●	●	●	●	●	●	●	1
✺	✺	✺	✺	✺	✺	✺	✺	2
✺	●	●	●	●	●	●	●	3
✺	✺	✺	✺	✺	✺	✺	●	4
✺	✺	✺	✺	✺	✺	●	●	5
✺	✺	✺	✺	✺	●	●	●	6
✺	✺	✺	✺	●	●	●	●	7
✺	✺	✺	●	●	●	●	●	8
✺	●	✺	✺	●	●	●	●	9
✺	●	✹	✺	●	●	●	●	10
✺	F	●	✺	●	●	●	●	11
✺	✺	●	✺	●	●	●	●	12
✺	●	●	✺	●	●	●	●	13
✺	✺	●	●	●	●	●	●	14
✺	●	●	F	●	●	●	●	15
✺	●	●	●	SF	●	●	●	16
✺	●	●	●	F	●	●	●	17
✺	●	●	●	SLF	●	●	●	18
✺	●	●	AF	AF	●	●	●	19

●= LED Off
Z= LED On
AF = Alternate Flashing
F = Flashing
SF = Single Flash
SLF = Slow Flashing

Troubleshooting Chart (Problems with LED Indications)

Table 3-2 lists a number of problems or conditions that may be encountered with the printer. These condition or problems generally have LED indications as listed in Table 3-1, “LED Quick Reference Chart” on page 3-2.

Table 3-2. Troubleshooting Chart (Problems with LED Indications)

#	Symptom	Diagnosis	Action
1	No LEDs turn on.	No AC power applied to the printer.	Ensure AC power cable is connected to a working voltage source.
		Faulty AC power fuse.	Replace fuse.
		No voltage from the power supply.	Replace power supply.
2	All LEDs turn on and stay on and printer locks up while running Power-On Self Test.	An improper configuration was set.	Reload factory defaults and then set correct parameters.
		Main logic board faulty or loose interconnecting cables.	Ensure cables are properly connected. Replace main logic board.
3	Power LED on and all other LEDs off. No printer operation possible.	Printer misconfigured for peel-off mode or peel-off option not installed	If peel-off option is installed, check take-label sensor. If peel-off option is not installed, check printer configuration and ensure peel-off mode is not selected.
		Main logic board faulty or loose interconnecting cables	Ensure cables are properly connected. Replace main logic board.
4	Calibrate LED turns off after 5 seconds but all other LEDs stay on.	Boot block error.	Download new boot block and firmware. Replace main logic board.
5	Calibrate and position LEDs off but all other LEDs on.	Dynamic RAM failed.	Replace main logic board.
6	Calibrate, position, and darken LEDs off but all other LEDs on.	Firmware decompression error.	Download and install firmware.
7	Calibrate, position, darken, and data LEDs off but all other LEDs on.	Firmware error.	Download and install firmware.
8	Calibrate, position, darken, data, and pause LEDs off but all other LEDs on.	Firmware error.	Download and install firmware.

Table 3-2. Troubleshooting Chart (Problems with LED Indications) (Cont.)

#	Symptom	Diagnosis	Action
9	Printer stops, pause and paper/ribbon LEDs both on.	Media incorrectly loaded or not loaded.	Load media correctly, then turn printer off and on.
		Cutter error.	Clear jam, then open and close printhead.
		Calibration error.	Recalibrate printer.
		Misadjusted media sensor.	Check position and sensitivity media sensor.
10	Printer stops, pause LED on and paper/ribbon LED flashing.	Ribbon incorrectly loaded or not loaded.	Reload ribbon correctly, then turn printer off and on.
		Liner rewind spindle is full.	Remove liner from spindle.
		Ribbon not calibrated.	Recalibrate the ribbon.
		Malfunctioning ribbon sensor.	Replace ribbon sensor.
11	Printer stops, pause LED on and printhead LED flashes.	Printhead not fully closed.	Close printhead completely.
		Printhead-open sensor not detecting flag or flag not in proper position.	Check head-open sensor and flag for proper operation.
12	Printer stops, pause LED and printhead LED on.	Printhead element overheated.	Printer resumes printing when printhead element cools.
		Power supply over-temperature.	Printer resumes printing when power supply cools.
13	Printer stops and pause LED on.	PAUSE was accidentally or intentionally pushed.	Press PAUSE to resume operation.
		Not enough memory to: 1. Download graphics. 2. Create bitmap (not enough memory for length of label). 3. Build format (label too complex).	You may do the following: 1. Check for proper Communication Configuration. 2. With PAUSE on, use the **~HM** ZPL II command to display the amount of free memory. 3. With PAUSE on, press CANCEL to skip that label format and continue to the next one. 4. Cycle power off and on to clear printer memory and start again.
14	Printhead LED on but printing continues.	Printhead is under-temperature.	Check print quality. Printhead heats up by printing or moving printer to a warmer area.
15	Pause LED flashing.	Waiting for user to remove peeled label.	Remove Label.

Table 3-2. Troubleshooting Chart (Problems with LED Indications) (Cont.)

#	Symptom	Diagnosis	Action
16	Data LED single flash.	CANCEL key pressed and a format deleted.	No action required.
17	Data LED flashing.	Printer receiving data.	Printing resumes when data is received.
18	Data LED flashing slow.	Printer sent a “stop transmitting” to the host computer.	No action required.
19	Pause and Data LED alternately flashing, but all other LEDs on.	Firmware error.	Download and install firmware.

Table 3-3. Troubleshooting Chart (Problems with LED Indications)

Symptom	Diagnosis	Action
Dots missing in printed area of label.	Dirty printhead.	Clean printhead.
	Print quality problems.	Check print quality.
	Printhead element going bad.	Replace printhead.
Loss of printing registration on labels.	Possible media sensor problem.	Adjust media sensor.
		Replace media sensor.
	Printer set for non-continuous media, but continuous media loaded.	Set printer for correct media.
Loss of printing registration on labels (for Peel-Off Mode).	Improperly adjusted media edge guides or power roller.	Check edge guides and power roller. Adjust as necessary.
Vertical drift in top-of-form registration.	Incorrect media loading or media sensor adjustments.	Reload media or adjust sensors as necessary.
Light vertical lines approximately 0.006" (0.15 mm) wide running through all labels	Dirty printhead or ribbon rollers.	Clean printhead and ribbon rollers.
	Defective printhead elements.	Replace printhead.
Light printing or no printing on left or right side of label.	Printhead pressure needs balancing.	Perform printhead balance adjustments.
Short printed lines at 45° to label edge on left or right side of label.	Too much printhead pressure.	Reduce toggle pressure.
Truncated print, no print, or FEED operates incorrectly while using non-continuous media.	Media or ribbon improperly loaded.	Reload media or ribbon.
	Incorrect media sensor position or sensitivity.	Adjust media sensor.
Fine gray lines on blank labels at angles.	Wrinkled ribbon.	See “Troubleshooting Chart (Wrinkled Ribbon)” on page 3-8.
Misregistration and misprint of one to three labels.	Media pulled when motor not moving.	Open and close printhead so it calibrates to find label length.
	Incorrect media sensor position or sensitivity.	Adjust media sensor.
	Auto-calibrate failed.	Perform manual calibration.
When using ribbon wider than 2.4" (61 mm), image gets lighter or smears near end of roll of ribbon. Ribbon appears to slow down or stop.	Too much back tension on ribbon.	Adjust dual-tension ribbon supply spindle to provide low tension by pushing in spindle end-cap.

Table 3-3. Troubleshooting Chart (Problems with LED Indications) (Cont.)

Symptom	Diagnosis	Action
Poor print quality.	Darkness too low.	Increase print darkness.
	Incorrect media and ribbon combination.	Replace media or ribbon.
	Printhead adjustments incorrect.	Perform required adjustments.
Misregistration/skips labels.	Misadjusted media sensors.	Perform media sensor adjustments. Also try recalibrating.
	Improper ZPL format.	Correct ZPL format.
Printing across web or in wrong position.	Loss of registration, indicating media sensor problem.	Adjust media sensor position. Adjust media sensor sensitivity.
	Printer set for continuous media, but non-continuous media loaded.	Set printer for correct type of media.
	Peel-Off Mode: Improperly adjusted media edge guides or power roller.	Reposition and adjust as necessary.
Long tracks of missing print on several labels.	Wrinkled ribbon.	See “Troubleshooting Chart (Wrinkled Ribbon)” on page 3-8.
	Print element damaged.	Replace printhead.

Troubleshooting Chart (Wrinkled Ribbon)

Table 3-4. Troubleshooting Chart (Wrinkled Ribbon)

Symptom	Diagnosis	Action
Wrinkled ribbon.	Ribbon fed through printer incorrectly.	Load ribbon correctly.
	Incorrect darkness setting.	Set darkness to lowest setting possible for good print quality.
	Incorrect printhead pressure or balance.	Set pressure to minimum needed.
	Media not feeding properly. Media walking side to side.	Make sure media is running parallel to main frame with balance adjustment.
	Incorrect dual-tension spindle setting.	Pull spindle end cap out when using wide media to obtain normal (higher) tension.
	Strip plate needs adjusting.	Perform adjustments.
	Ribbon supply spindle tension needs adjusting.	Perform adjustments.
	Printhead needs realigning with platen roller.	Perform adjustments.
	Ribbon take-up spindle tension needs adjusting.	Perform adjustments.

Troubleshooting Chart (Jammed or Stuck Labels)

Table 3-5. Troubleshooting Chart (Jammed or Stuck Labels)

Symptom	Diagnosis	Action
In Peel-Off Mode, skewed or stuck labels.	Label adhesive material causing media movement problems.	Perform maintenance and clean printer.
Media and liner not properly aligned in printer.	Reload media. Adjust power roller.	Label jam in rear area of printhead.
Upper media plate needs cleaning.	Remove jam and clean upper media plate.	

Troubleshooting Chart (Settings or Parameter-Related)

Table 3-6. Troubleshooting Chart (Settings or Parameter-Related)

Symptom	Diagnosis	Action
Changes in parameter settings did not take effect.	Parameters set or saved incorrectly.	Reload factory defaults, calibrate printer, then cycle power off and on.
	If problem continues, may be a problem with main logic board.	Replace main logic board.
ZPL sent to printer, but not recognized. Data LED remains off.	Communications parameters incorrect.	Print a configuration label to verify host computer and printer settings match. If they do, perform Mode Key Self Test to check for format or overrun errors.
	Prefix and delimiter characters set in printer do not match ones used in ZPL.	Set characters to match ZPL format. If problem continues, check ZPL format for changed ^CC, ^CT and ^CD.
Printer does not successfully auto calibrate.	Printhead open.	Close printhead.
	Preprinted media being used.	Perform manual calibration.
	Media out.	Load media and check media sensor.

Printer Status Sensors

The printer contains several status sensors that indicate conditions by either stopping printing or turning on an LED.

Troubleshooting Chart (Cutter-Related)

Table 3-7. Troubleshooting Chart (Cutter-Related)

Symptom	Diagnosis	Action
In Cutter Mode, skewed or stuck labels.	Dirty cutter.	Clean cutter module.
The cutter is not cutting labels cleanly.	Dirty cutter.	Clean cutter.
	Dull cutter blades.	Replace cutter module.
Jamming up with labels or labels being cut more than once.	Dirty cutter.	Clean cutter.
	Label length too short.	Increase label length.
Labels not being cut at all.	Cutter option not available.	Cutter option installed at the factory. Noncutter units not retrofittable.
	Cutter option not installed or enabled.	Check cutter configuration.

Table 3-8. Printer Status Sensors

Sensor	What It Monitors	How It Works
Printhead Sensor	Checks open/closed status of printhead lever.	If printhead is open, printhead LED flashes.
Media Sensor	Checks for proper media loading.	If printer runs out of media, paper/ribbon LED turns on.
	If non-continuous media is used, sets label length for individual labels.	
Ribbon Sensor	Monitors presence of ribbon.	If printer runs out of ribbon, paper/ribbon LED flashes.
Label-Available Sensor (Peel-Off option only)	In Peel-Off Mode, checks to see whether a label is available.	Once a label prints, it passes between the two parts of this sensor and causes printer to pause. When label is removed, printing resumes.
Liner Rewind Spindle Full Sensor (Peel-Off option only)	Senses when liner rewind spindle is full of used liner.	When spindle is full, paper/ ribbon LED flashes.

Factory Assistance

Should you encounter any problem that cannot be corrected with the aid of this manual, and you have Internet access, check out ZIP Support. If you cannot solve your problem via ZIP Support or do not have Internet access, contact your Distributor or Zebra Technologies Technical Support Department to minimize or avoid printer downtime.

ZIP Support

- Can identify, diagnose, and resolve your questions in one brief, easy, online session.
- ZIP Support is updated regularly by Zebra product experts, guaranteeing the most comprehensive, timely product information available.
- High-speed, accurate, intuitive database uses text and graphics.
- Available any time, all time zones, 24 hours a day, 365 days a year.

Access ZIP Support at **http://support.zebra.com.**

Technical Support

Zebra Technologies, USA
Phone: +1 847.793.2259
Fax: +1 847.913.2578

Zebra Technologies Europe Limited, UK
Phone: +44 (0) 1494 536644
Fax: +44 (0) 1494 450103

Repair Service Department

For in-factory service and repair:

Zebra Technologies, USA
Phone: +1 847.913.2259
Fax: +1 847.913.2578

Zebra Technologies Europe Limited, UK
Phone: +44 (0) 1494 472872

Returning Equipment

A Return Materials Authorization (RMA) number is required for all equipment being returned. Contact Zebra Technologies Technical Support Department to obtain an RMA number. Equipment returned for service without prior authorization may be refused.

Whenever possible, the original shipping container should be used. Should it become necessary to ship your printer, carefully pack the printer in a suitable container to avoid damage during transit. A note describing the failure must be enclosed with the unit. Replacement shipping containers can be ordered by contacting Zebra Technologies Technical Support Department.

If other containers are used, packaging material similar to the original factory packaging should be used. Remove all media from the printer. Enclose the unit in a protective, dustproof bag and ensure that the unit floats in an outer carton of shock-absorbing material.

Zebra

Section 4
Preventive and Corrective Maintenance

Maintenance Concepts

Maintenance for the Zebra Stripe *S*400 and *S*600 thermal transfer demand printers can be divided into two basic categories:

- **Preventive Maintenance** procedures and operator care instructions. These procedures may be performed by the operator as well as the service technician and should be performed on a regular basis. Preventive maintenance consists of a visual inspection and general cleaning of the interior and exterior of the printer, as well as cleaning the printhead and the associated media and ribbon paths.
- **Corrective Maintenance** provides the service technician detailed steps for resolving faults by adjusting or replacing components or modules.

Equipment Safety Tips

After reviewing each procedure, place a check in the box.

- o The AC power plug and IEC 320 connectors on all Zebra Printers must bear the certification mark of at least one international safety organization listed below.

- o Unless indicated otherwise, turn the power Off (**O**) before performing any maintenance procedures to the printer.

- o To prevent damage to the spindles, **do not** lubricate the *S*400™ and *S*600™ printer spindle assemblies.

- o To prolong printhead life, when reinstalling the printhead, secure the grounding strap to the printhead mounting screw.

- o Zebra printers comply with international regulations governing radiated emissions when using fully shielded data cables. Data cables must be fully shielded and fitted with metal or metalized connector shells. Required shielded data cables and connectors prevent radiation and reception of electrical noise. Use of unshielded data cables may increase radiated emissions above the regulated limits.

Equipment Safety Tips (Continued)

- To ensure optimum printhead life, observe proper electrostatic safety precautions (for example; ESD, Electrostatic Service Device, wrist straps) when removing, handling, and replacing the printhead.

- Zebra recommends using solvent containing 90% isopropyl alcohol and 10% distilled water for cleaning:
  - Printheads
  - Platen Rollers
  - Peel-Off Roller
  - Media Path
  - Peel/Tear Bar
  - Spindles

- Ribbons used in the printers must be as wide as or wider than the media. If the ribbon is narrower than the media, areas of the printhead will be unprotected and subject to premature wear.

- To ensure the printer has proper ventilation and cooling, do not place any padding or cushioning material under the unit because this restricts air flow.

- Install Zebra printers on a solid, level surface of sufficient size and strength to accommodate the physical dimensions and weight of the unit. The area enclosure in which the printer will operate must meet the environmental conditions specified in the maintenance manual or User's Guide. Electrical power must be available and in close proximity to the printer.

Personal Safety Tips

- Do not wear any jewelry (rings, watches, etc.) and loose clothing when servicing the printers.

- Beware of “Pinch Points” on the printers. Be especially careful of:

  - Opening and closing covers
  - Printhead
  - Rewind Spindle
  - Platen Roller

- Wear protective eye wear when removing E-Rings, C-Clips, and springs.

- For personal and equipment safety, use a three-prong plug with a ground (earth) connection.

Preventive Maintenance Schedule

Cleaning – General

Caution:

Use only the cleaning agents described in the following procedures. Damage can occur if the incorrect cleaning agents are used on this printer.

Exterior – Clean the exterior surfaces of the printer as required by using a lint free cloth. Do not use solvents or harsh cleaning agents. If the unit is excessively dirty, a mild detergent solution or desktop cleaner may be used sparingly.

Interior – As required, remove any dirt/lint accumulated in the interior of the printer by using a softbristle brush, dry compressed air, or vacuum cleaner. It is a good practice to inspect these areas with each media change.

Media and Ribbon Paths – Clean with a solution of 90% isopropyl alcohol and 10% distilled water. No other cleaning fluids or sprays should be used.

Table 4-1 lists a recommended cleaning schedule showing the area, method, and interval for cleaning the printer. Actual schedule should be adjusted based on volume of labels printed and environmental conditions where the printer is located.

Table 4-1. Recommended Cleaning Schedule

AREA	METHOD	INTERVAL
Printhead	Clean with a solution of 90% isopropyl alcohol and 10% distilled water.	After every roll of media or 500 feet (150 m) of fanfold media) when in direct thermal mode. After every roll of ribbon when printing in thermal transfer mode.
Platen Roller	Clean with a solution of 90% isopropyl alcohol and 10% distilled water.	
Media Sensor	Air blow.	
Media Path	Clean with a solution of 90% isopropyl alcohol and 10% distilled water.	
Ribbon Path	Air blow.	
Rewind Power Roller (Peel-Off)	Clean with a solution of 90% isopropyl alcohol and 10% distilled water.	
Upper Guide Rod (Peel-Off)	Clean with a solution of 90% isopropyl alcohol and 10% distilled water.	
Platen Guide Rod (Peel-Off)	Clean with a solution of 90% isopropyl alcohol and 10% distilled water.	
Lower Guide Rod (Peel-Off)	Clean with a solution of 90% isopropyl alcohol and 10% distilled water.	
Cutter Assembly – If using continuous pressure-sensitive media.	Citrus-based adhesive remover.	After every roll of media or more often depending on application and media.
Cutter Assembly – If using tag stock or liner only.	Clean with a solution of 90% isopropyl alcohol and 10% distilled water. Air blow.	After every 2 or 3 rolls of media.
Tear-Off/Peel-Off Plate	Clean with a solution of 90% isopropyl alcohol and 10% distilled water.	Once a month.
Exterior	Mild detergent or desktop cleaner	As needed.
Interior	Air blow/brush/vacuum.	As needed.
Label Available Sensor	Air blow.	6 months/500 rolls
Belts	Visual inspection for wear	6 months/500 rolls

Cleaning – Printhead and Platen Roller

Inconsistent print quality such as voids in the bar codes or graphics may indicate a dirty printhead. For optimum performance, the printhead should be cleaned regularly with a swab soaked in 90% isopropyl alcohol and 10% distilled water. This cleaning procedure is the best thing you can do to maintain consistent, high quality printing.

Zebra recommends performing the cleaning procedure when installing a new roll of ribbon, when installing a new roll of direct thermal media, or after having printed 500 feet (150 m) of continuous or fanfold media.

It is not necessary to turn the power off prior to cleaning. If the power is turned off, all label formats, images, and parameter settings stored in RAM will be lost. Permanent parameter settings stored in Flash memory will be retained. When power is turned back on, it may be necessary to reload some information items into the printer's memory.

Printhead and Platen Roller Cleaning Procedure

1. Refer to Figure 4-1. Open the main door and front door.
2. Open the printhead by turning the locking lever counterclockwise.
3. Remove the media and ribbon if present.
4. Refer to Figure 4-2 on page 4-9. Use a cleaning swab to wipe the print elements from end to end. Allow a few seconds for the solution to evaporate.
5. Rotate the platen roller and clean thoroughly with a cleaning swab.
6. Brush or vacuum any accumulated paper, lint, and dust away from all of the rollers and the media and ribbon sensors.
7. Reload the ribbon and/or media. Close and latch the printhead. Close the main and front doors, and restore power (if previously turned off).
8. Run the Pause Key Self Test to check print quality.

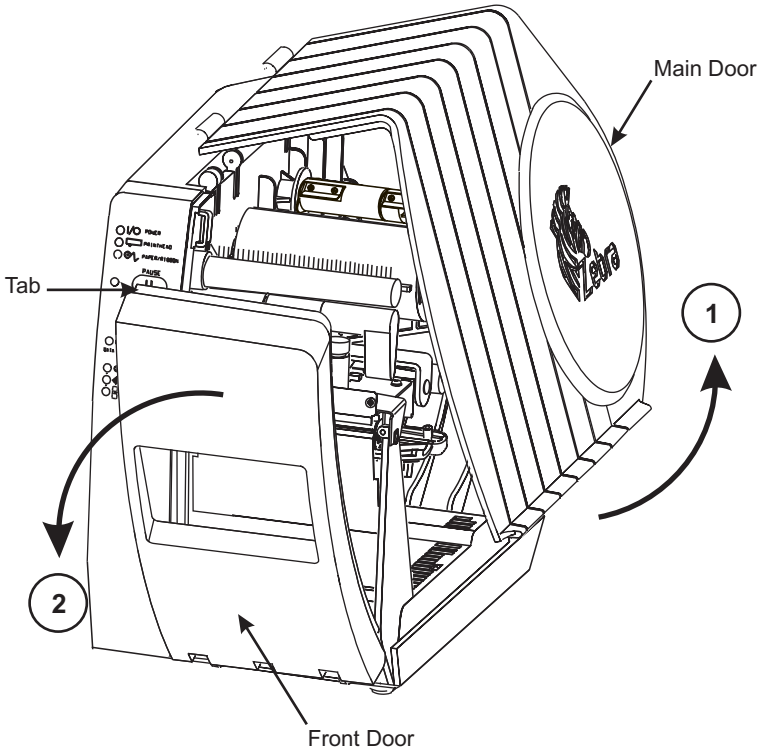

Figure 4-1. Main Door and Front Door

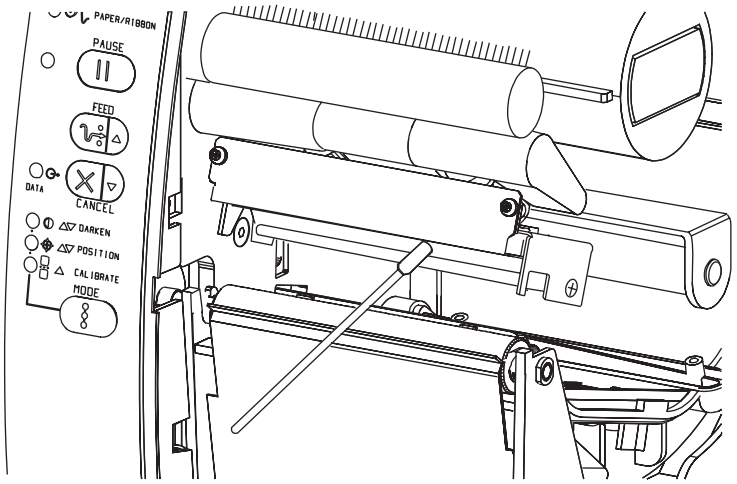

Figure 4-2. Printhead Cleaning

Cleaning the Cutter Module

The cutter module is an option available on the *S*400/*S*600 that requires periodic cleaning to remove paper dust and gummed label residue. The following procedure should be performed, as scheduled in Table 4-1, by the operator. However, depending on the application and media type, it may be necessary to clean the cutter more or less often.

Note • In figures shown, media, and ribbon have been removed for clarity. It is not necessary to remove the media or ribbon prior to performing the maintenance procedures described.

Caution:

Do not exchange cutter modules between different printers. The cutter module adjustment are optimized during installation to work with a particular printer, and may not perform correctly if placed on a different printer.

Remove the cutter module from the printer.

1. Turn the printer's AC power Off (**O**).
2. Refer to Figure 4-3 on page 4-10. Remove the cutter catch tray by lifting it up and away from the front of the cutter module.
3. Refer to Figure 4-1 on page 4-8. Raise the main door and lower the front door.
4. Refer to Figure 4-4 on page 4-10. Gently pull straight down on the cutter cable connector to remove it from the cutter module.
5. Turn the cutter mounting screw in a counterclockwise direction until it is loose.
6. Hold the cutter module as shown in Figure 4-5 on page 4-11. Apply gentle upward pressure to the left and right ends while raising the cutter module up and away from the mounting posts. If necessary, rock the cutter module side to side to loosen it.

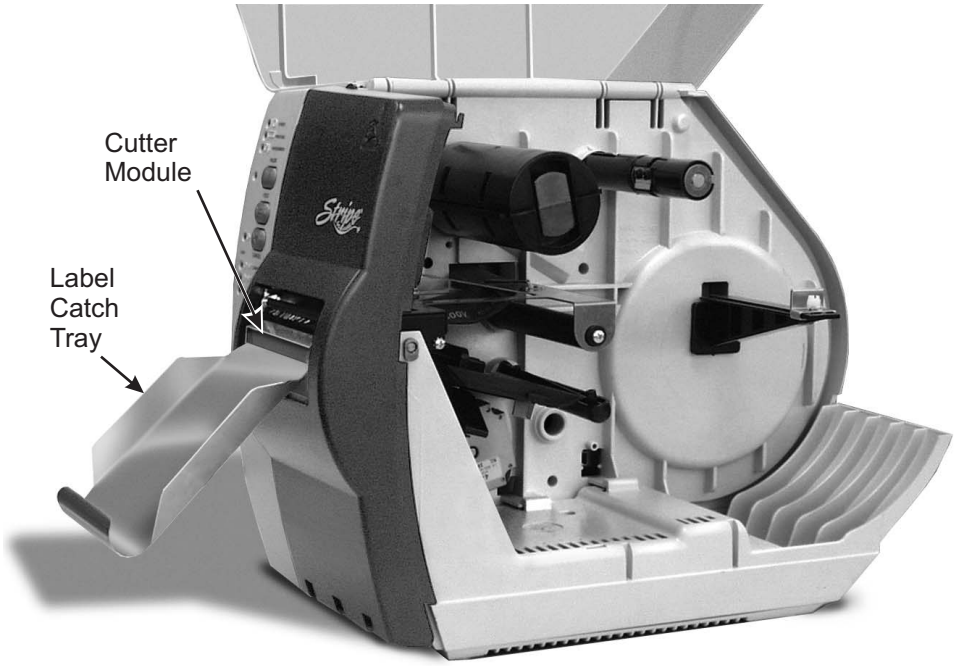

Figure 4-3. Cutter Catch Tray Location

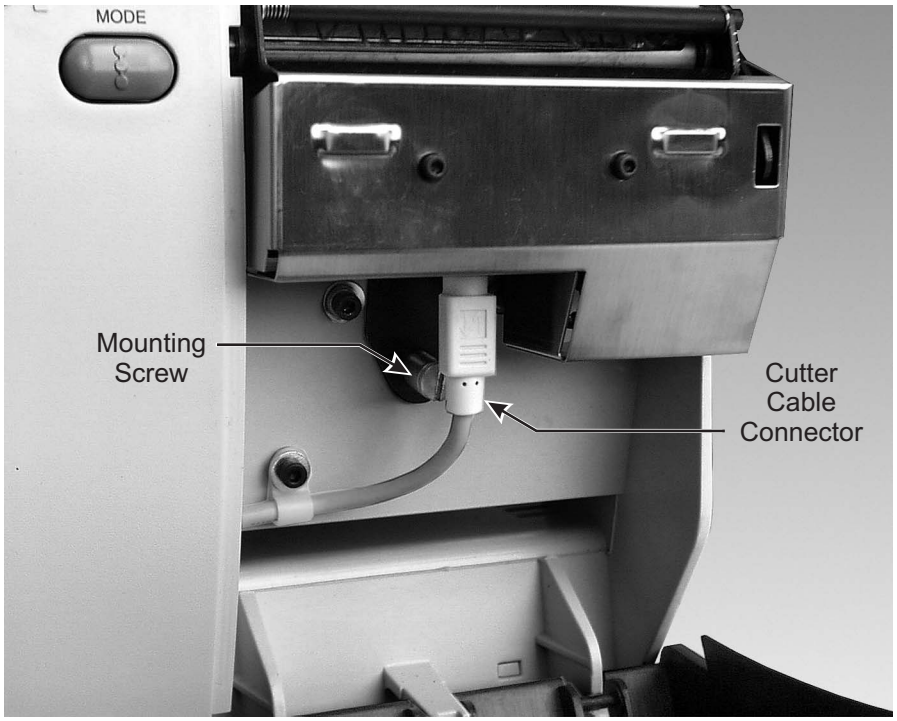

Figure 4-4. Cutter Connector and Mounting Screw

Figure 4-5. Cutter Module Removal

Disassembling the Cutter Module

1. Lay the cutter module on a table or other surface. Hold the cutter module as shown in Figure 4-6 on page 4-12. Put your thumbs on the two wire spring loops and your index fingers on the top of the rear cutter blade guard.
2. To remove the rear cutter blade guard, first press down simultaneously on the two wire spring loops. While still pressing down on the wire spring loops, press the rear cutter guard back toward you and over the top of the loops. You are trying to tuck the wire spring loops under the cutter blade guard.
3. Continue pressing the rear cutter guard toward you and allow the back edge of the guard to pop up as it comes free from its holders. You may now remove the rear cutter guard by lifting it off of the module.

Note • The wire springs may flip up out of position during this process. They will be repositioned during reassembly.

4. Observe the ends of the rear cutter blade guard and note the small metal pins protruding toward the inside. During the reassembly procedure, these pins will be mounted into the corresponding mounting slots in the cutter side panels.
5. To provide complete access to the area to be cleaned, raise the upper cutter blade guard as shown in Figure 4-6 on page 4-12.

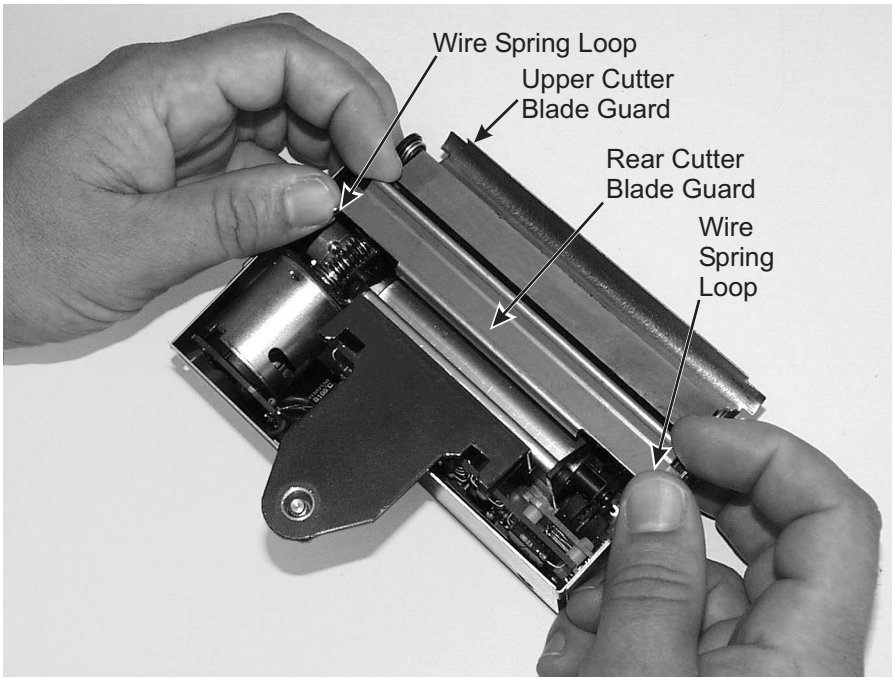

Figure 4-6. Cutter Module Disassembly

Cleaning the Cutter Module

1. Remove any label material that has adhered to the cutter parts and use a small brush to remove any paper dust from the cutter module.
2. If pressure-sensitive media has been used, use a lint-free cloth soaked in an adhesive remover to clean all gum and label residue from the cutting blades and guards.
3. If tag stock was used, use 90% isopropyl alcohol and 10% distilled water to remove any dirt.

Reassemble the Cutter Module

1. Refer to Figure 4-7 on page 4-13. Position the two wire springs down against the lower cutter blade.
2. Place the rear cutter blade guard over the wire springs, perpendicular to its final position. Place your thumbs on the top (flat) part of the guard.

Note • Ensure that the ends of the rear cutter blade guard are positioned on the outside of the cutter side panels.

3. Refer to Figure 4-8 on page 4-13. Press the rear cutter blade guard down and forward, rotating the guard as you proceed, to lock the mounting pins into position in the cutter side panel mounting slots. Slide the guard forward until the two wire spring loops pop up on the backside of the guard.

Note • Ensure that the wire springs remain positioned under the rear cutter blade guard when assembly is completed.

4. Lower the upper cutter bade guard back to its normal position. When reassembled, the back of the cutter module looks like Figure 4-9 on page 4-14.

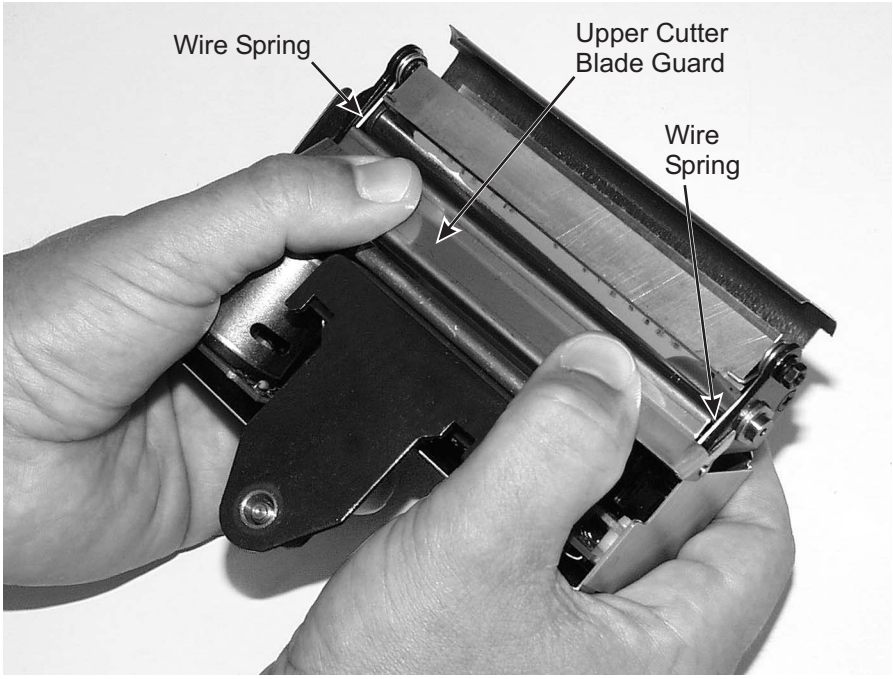

Figure 4-7. Cutter Module Reassembly

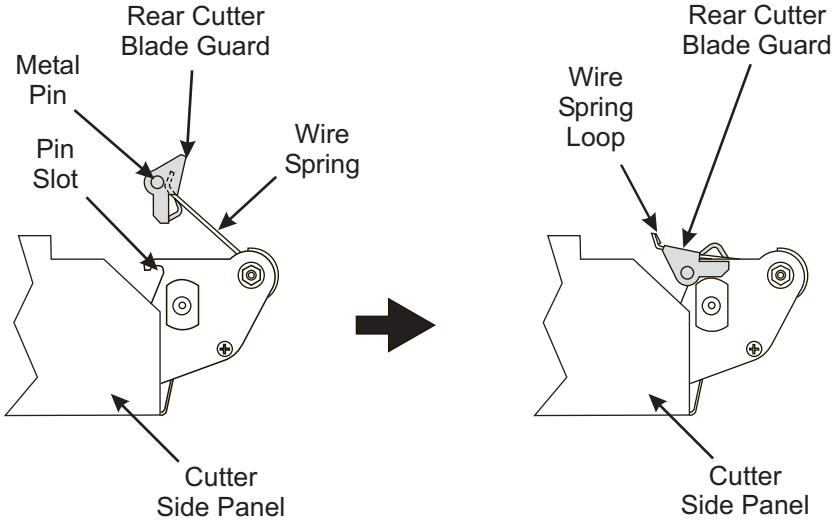

Figure 4-8. Side View of Cutter Module Reassembly

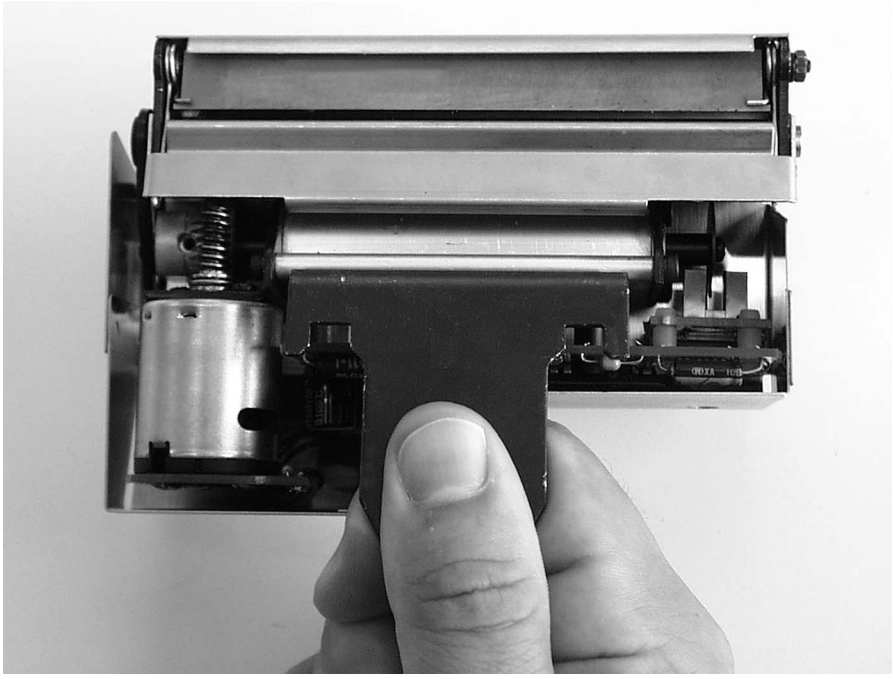

Figure 4-9. Reassembled Cutter Module

Reinstall the Cutter Module

1. Refer to Figure 4-10 on page 4-15. Position the cutter module above the cutter mounting posts. Press down on the cutter module until the mounting slots engage the mounting posts on the printer.
2. Refer to Figure 4-4 on page 4-10. Tighten the mounting screws in a clockwise direction to hold the cutter module in position.
3. Position the cutter cable connector so the flat side of the connector faces away from the printer. Insert the connector up into the mating connector on the cutter module.
4. Replace the cutter catch tray on to the two mounting slots located on the front of the cutter module.

Test the Cutter Operation

1. If necessary, reload ribbon and media into the printer. Close the printer's front door and main door.

Note • When loading media, make sure the end of the label is positioned on top of the platen roller, then close the printhead latch.

2. When the printer is turned on, the cutter module will cycle through one cutting operation and be ready to print labels.
3. Further tests may be performed by running a Pause Key Self Test.

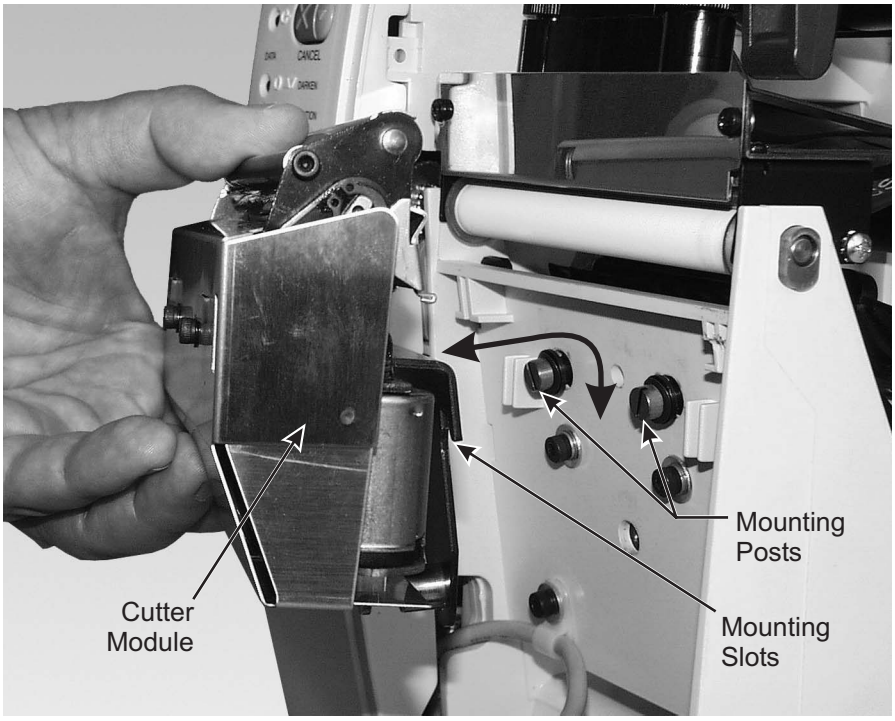

Figure 4-10. Cutter Module Reinstallation

Lubrication

Caution:

No lubricating agents of any kind should be used on the printer! Some commercially available lubricants will damage the finish and mechanical parts.

Diagnostics

Printer Self Test/Reset Default Quick Reference Chart

Table 4-2 lists the self tests and default resets that can be accessed by pressing and holding a front panel key or keys and turning the power On (**I**). The “X” in the four columns on the right indicates which key or keys are pressed.

The ✓ indicates whether the self test should be performed by the operator (user) and/or maintenance personnel. These tests produce sample labels and provide specific information that helps the operator/maintenance personnel determine the operating conditions for the printer. self tests without the ✓ require special tools or knowledge and are for repair and maintenance of the printer and only should be performed by maintenance personnel.

Detailed information on the operator self tests are found in Section II Operations Overview. Detailed information on maintenance personnel-only self tests immediately follows.

Note • The data cable must be removed from the printer (except for the Mode key test) prior to running the self tests.

Pause and Cancel Key Self Test

Refer to Figure 4-11. This self test can be used to verify proper printer operation after parts have been replaced or adjusted. When activated, the printer prints a maximum of 500 head test labels. Each label backfeeds prior to printing and feeds forward to the rest position after printing. A serialized number prints on each label.

To start the Pause and Cancel Key Self Test, press and hold PAUSE and CANCEL while turning the power on.

Press PAUSE or turn the power off to stop printing.

Feed and Cancel Key Self Test

This self test is normally performed during the manufacturing process or after a major overhaul of the mechanical assemblies. This test prints seven preprogrammed formats at 6 ips and 2 ips. The printer automatically pauses after each format. Table 4-3 shows the sequence of formats. Refer to Figures 4-12 through 4-18 for sample label formats.

Table 4-2. Self Test and Calibration Reference Table

Operator	Description	Pause Key	Feed Key	Cancel Key	Mode Key
✓	**Cancel Key Self Test** – Produces a printer configuration label printout			X	
✓	**Pause Key Self Test** – Produces test printouts for adjustments (15 or 50 labels @ 2 or 6 ips)	X			
✓	**Feed Key Self Test** – Produces test printouts to determine the best darkness setting		X		
✓	**Mode Key Self Test** – Produces a communications diagnostic mode printout				X
✓	**Factory Default Reset** – Resets printer configuration to factory default values	X	X		
✓	**Communication Parameter Default Reset** – Resets printer communication parameters to 9600 baud, 8 bit work length, no parity, and 1 stop bit.	X	X		X
✓	**Manual Calibration** – Printer determines the media type, label length, media, and ribbon sensor settings, and printing method.	X	X	X	
	Pause and Cancel Key Self Test – Serialized test printouts verify proper printer operation (500 maximum)	X		X	
	Ribbon Parameter Calibration – Sets ribbon parameters to factory default values.		X	X	X
	Note • This test is performed only when sensor assemblies are replaced or if a manual calibration fails. A manual calibration procedure must be performed after the ribbon parameter calibration.				
	Feed and Cancel Key Self Test – Preprogrammed label test formats for major overhauls		X	X	

Table 4-3. Sequence of Formats

Format	# of Labels	Speed	Test Function	Figure
1	20	6 ips (Speed D)	Left Ribbon Wrinkle Test	4-12
2	20	6 ips (Speed D)	Right Ribbon Wrinkle Test	4-13
3	20	6 ips (Speed D)	Bar Code Wrinkle Test (Code – 39)	4-14
4	10	6 ips (Speed D)	Usable Area Test	4-15
5	10	6 ips (Speed D)	Head Temperature Test	4-16
6	10	6 ips (Speed D)	Upper Smear Test	4-17
7	10	6 ips (Speed D)	Lower Smear Test	4-18
8	20	2 ips (Speed A)	Left Ribbon Wrinkle Test	4-12
9	20	2 ips (Speed A)	Right Ribbon Wrinkle Test	4-13
10	20	2 ips (Speed A)	Bar Code Wrinkle Test (Code – 39)	4-14
11	10	2 ips (Speed A)	Usable Area Test	4-15
12	10	2 ips (Speed A)	Head Temperature Test	4-16
13	10	2 ips (Speed A)	Upper Smear Test	4-17
14	10	2 ips (Speed A)	Lower Smear Test	4-18

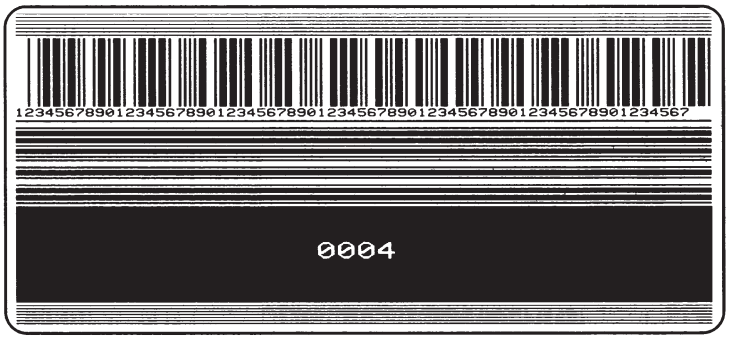

Figure 4-11. Pause and Cancel Key Label

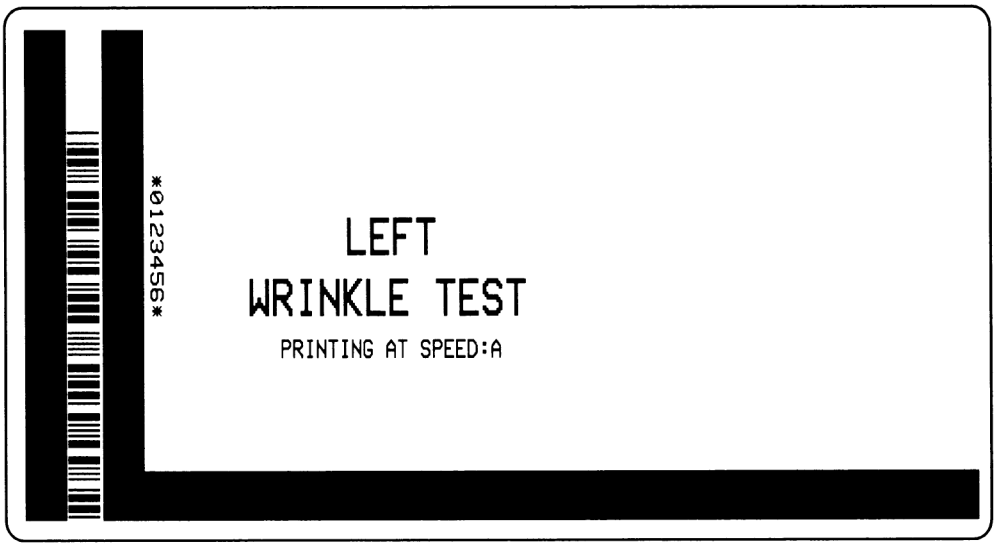

Figure 4-12. Test, Formats 1 and 8

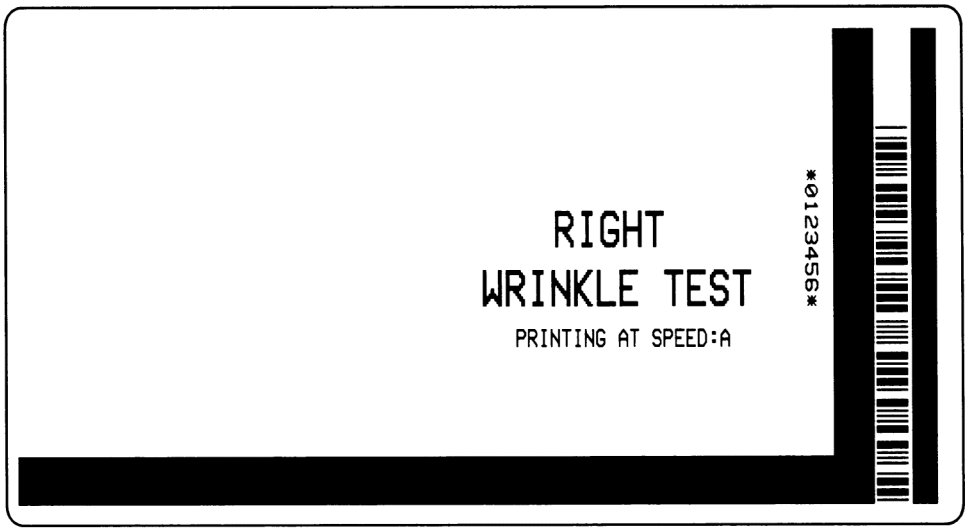

Figure 4-13. Test, Formats 2 and 9

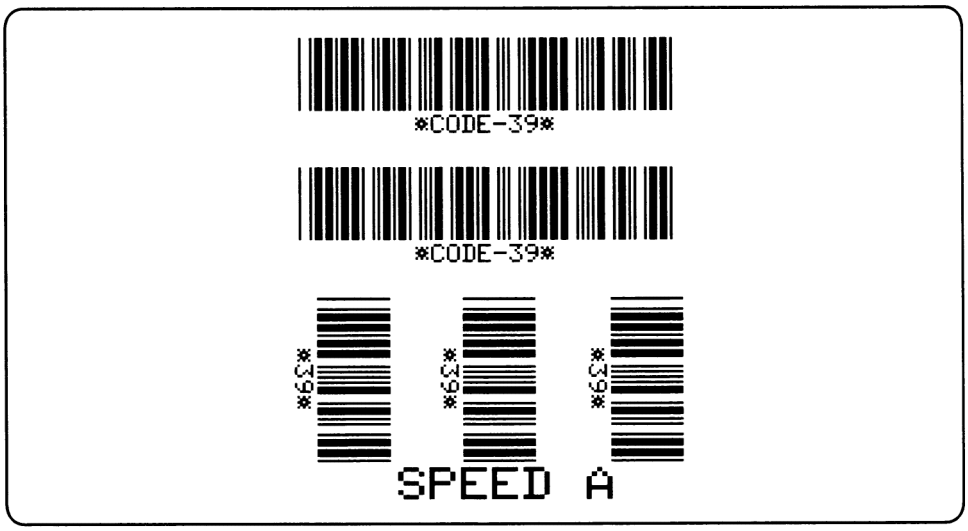

Figure 4-14. Test, Formats 3 and 10

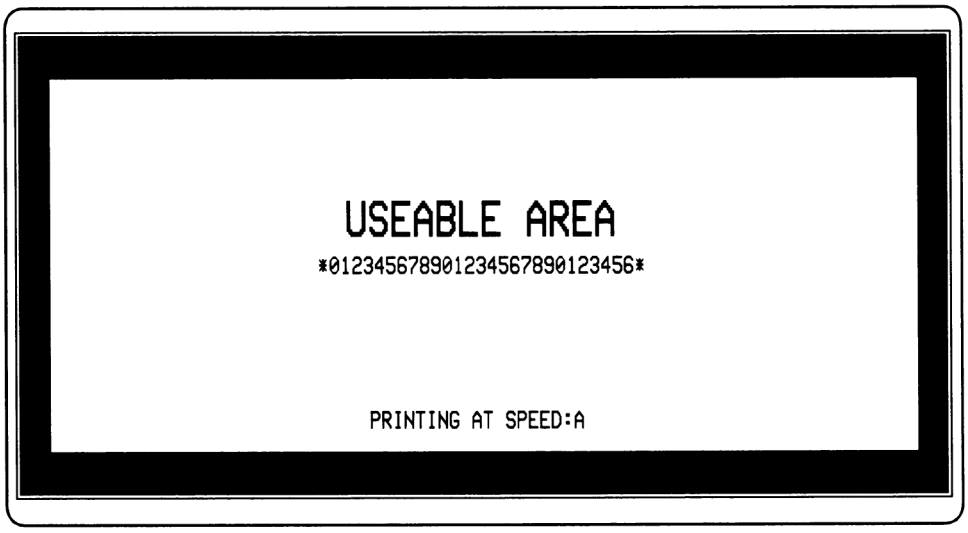

Figure 4-15. Test, Formats 4 and 11

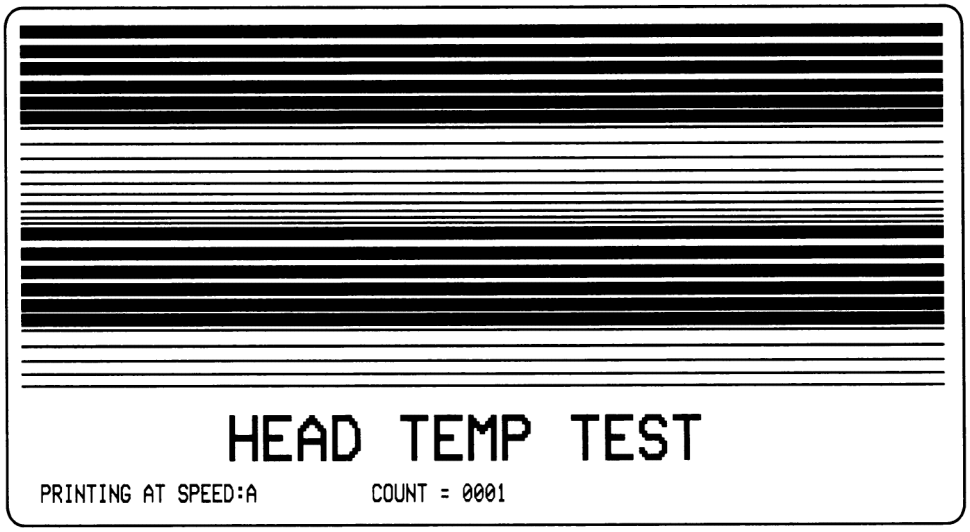

Figure 4-16. Test, Formats 5 and 12

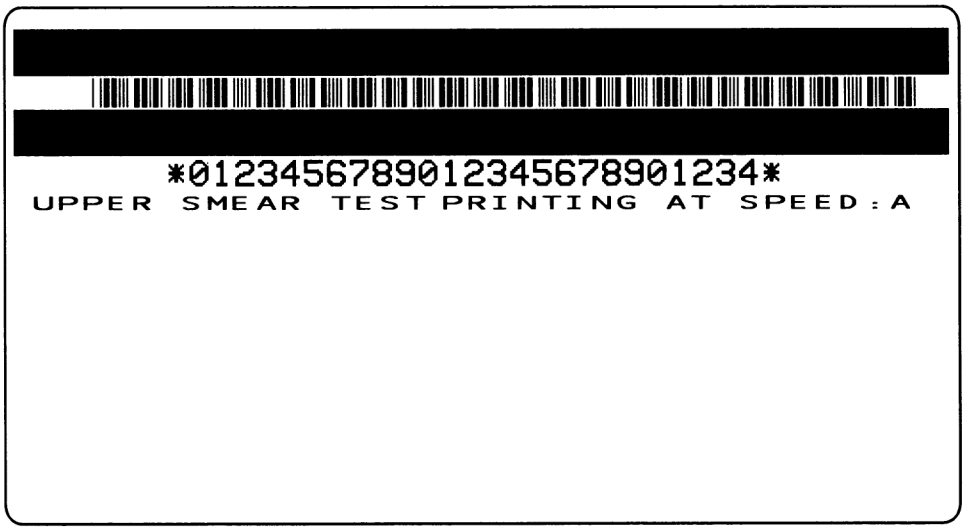

Figure 4-17. Test, Formats 6 and 13

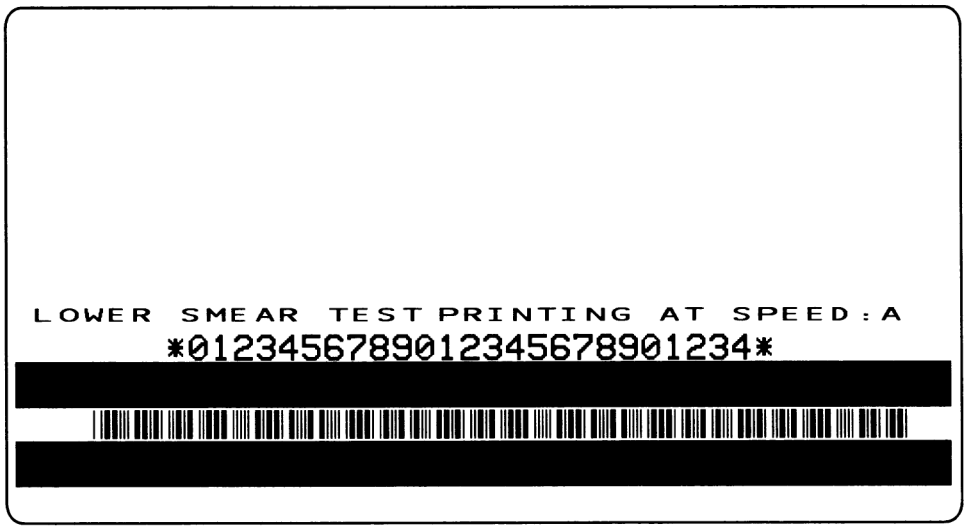

Figure 4-18. Test, Formats 7 and 14

Extended Printer Diagnostics

Additional diagnostic tests are available for printhead assembly adjustments. These diagnostic tests are accessible only when the data cable is disconnected from the printer and a loopback connector is attached in its place.

The serial loopback connector is a 9-pin “D” Type (DB9P – male) with pins 2 and 3, and pins 4 and 6 tied together.

The parallel loopback connector is a standard 36-pin parallel connector mounted to a small printed circuit board. This connector is available from Zebra Technologies as part # 44680.

For each of these diagnostic tests, the printer transmits the test label format out of the data connector to the loopback connector. The loopback connector passes the test label format to the printer as received data and the test label is printed.

Pause Key Loopback Test

This test demonstrates the media movement capabilities of the printer and provides a test label to view while making print quality adjustments.

With the loopback connector in place, press and hold PAUSE while turning the power On (**I**). After the Power-On Self Test, 500 head test labels print. Each label backfeeds prior to printing and feeds to the rest position after printing. A serialized number prints on each label. Press PAUSE to stop and restart the printing operation. The labels should look like the one in Figure 4-11 on page 4-18.

Feed Key Rollback Test

This test demonstrates the media movement capabilities of the printer and provides a test label to view while making print quality adjustments.

With the loopback connector in place, press and hold FEED while turning the power On (**I**). After the Power-On Self Test, the printer begins printing the same series of label formats as shown in Table 4-3. then pauses at the end of each printed format. Press PAUSE to begin printing the next format. Sample labels are shown in Figures 4-11 through 4-18.

PAUSE can be used to stop and restart the printing operation. When the printer is paused, CANCEL can be used to move to the next label format.

Mechanical Adjustments

Printhead Position Adjustment

1. Ensure the printer is loaded with full width media and ribbon, and has had a media calibration performed with this combination of media and ribbon.
2. Refer to Adjust the two printhead pressure screws for equal pressure.

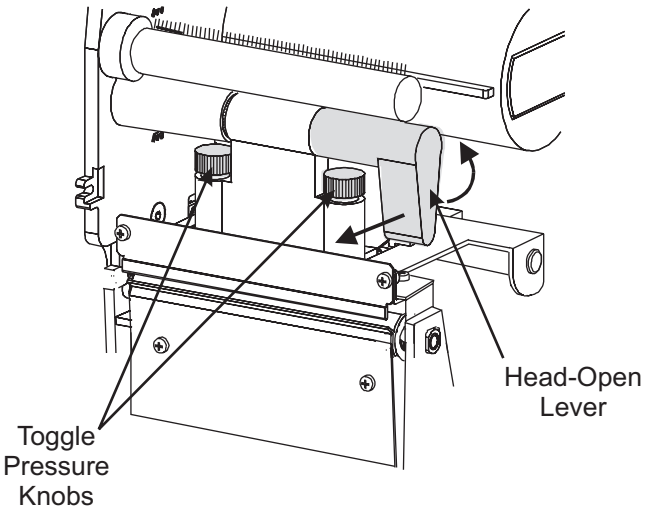

Figure 4-19. Printhead Pressure Screws

3. Turn the printer Off (**O**).
4. Remove the cutter module.
5. Refer to Figure 4-20 on page 4-25. Loosen, but do not remove, the two printhead position locking screws two full turns, then finger-tighten them.
6. Perform a Pause Key Self Test by pressing and holding PAUSE while turning the printer On (**I**).
7. When the printer completes its Power-On Self Test, it will begin the Pause Key Self Test. Once the Pause Key Self Test begins, let several labels print and then press PAUSE.
8. Examine the labels and make adjustments as required.
9. Using a flat-blade screwdriver, adjust the position adjustment slots to change the printhead position (forward and rearward), and adjust for parallelism.

Note • The desired result produces the darkest printing evenly across the label and lines printed on the test labels that are parallel to the top of the label.

10. Press PAUSE, let several more labels print, and then press PAUSE again.
11. Examine this set of labels and make any additional adjustments.
12. Repeat steps 10 and 11 until consistent print quality and parallelism is achieved.
13. Tighten the two printhead position locking screws.
14. Press PAUSE, let several more labels print, then press PAUSE again.
15. Examine this set of labels to make sure the print quality and parallelism are still good. If the adjustment “slipped” when you tightened the printhead position locking screws, loosen them, then repeat steps 9–13 until the print quality and parallelism are good. Tighten the printhead position locking screws.

Notes • If after the above adjustments the print quality is even, but not dark enough, perform "Adjusting the Printer Darkness" on page 2-26 until optimum darkness is achieved. If optimum darkness still cannot be achieved, it may be necessary to perform the "Printhead Pressure Adjustment" on page 2-29.

To extend the life of the printhead, use the lowest toggle pressure that produces the desired print quality.

16. If labels are printing properly, press PAUSE to stop printing.
17. Press MODE three times. The Mode LEDs flash and the settings are permanently saved to memory.
18. To exit the Pause Key Self Test, the printer must be turned Off (**O**).

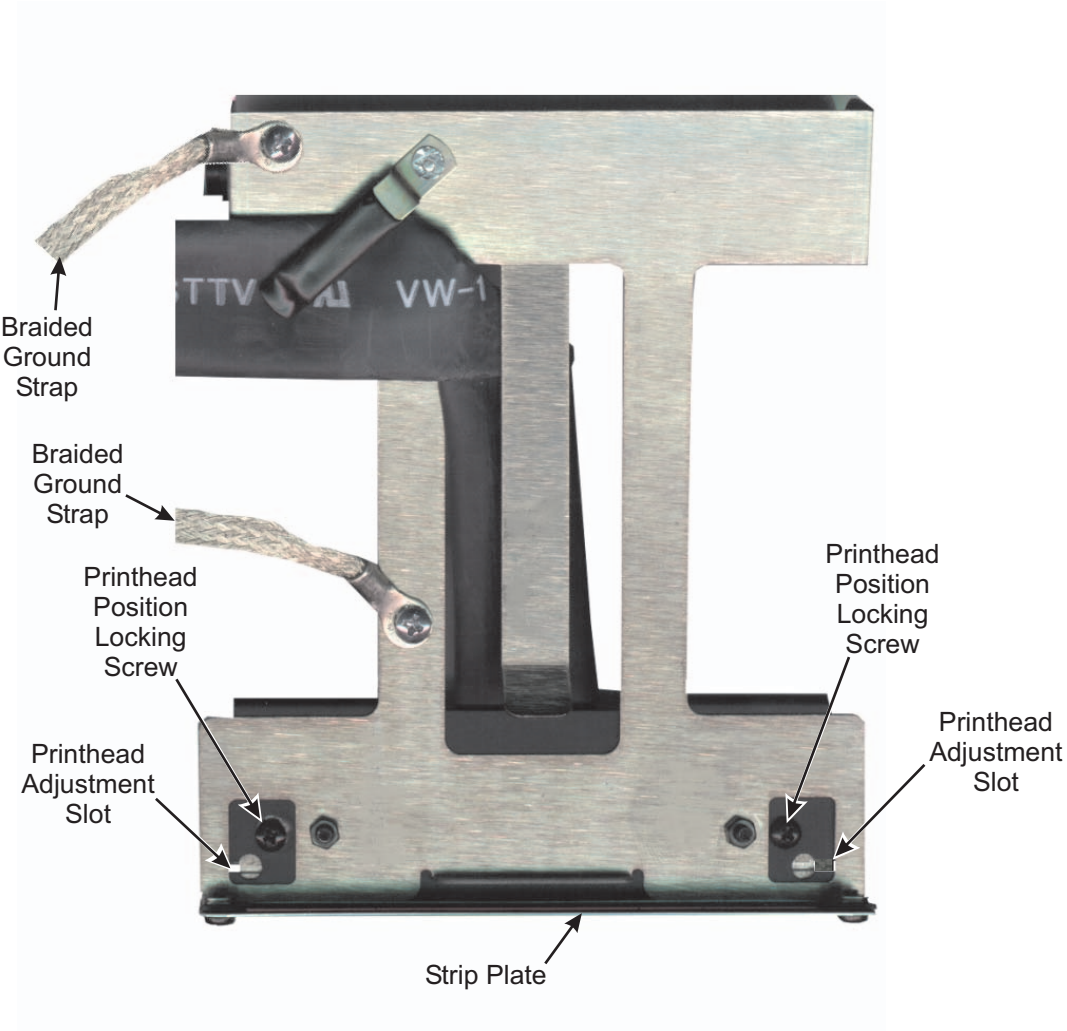

Figure 4-20. Printhead Position Adjustment (Top View)

Take-Label Sensor Adjustment

The label sensor functions only when the printer is set to Peel-Off Mode. This mode requires that the peel-off option be installed. This sensor is not installed on printers without the peel-off option.

Figure 4-21 shows the location of the take-label sensor. When the sensing beam is interrupted, printing and feeding are prevented. It may accept additional label formats if the buffer is not full. When the label is removed, the next label prints automatically.

There is no sensitivity adjustment of the take-label sensor. Sensors are attached, and aligned at the factory when the peel-off option is installed. If a problem is encountered, check the alignment of the sensor components. They should point directly at one another. Also verify that the format sent contains the peel-off mode command.

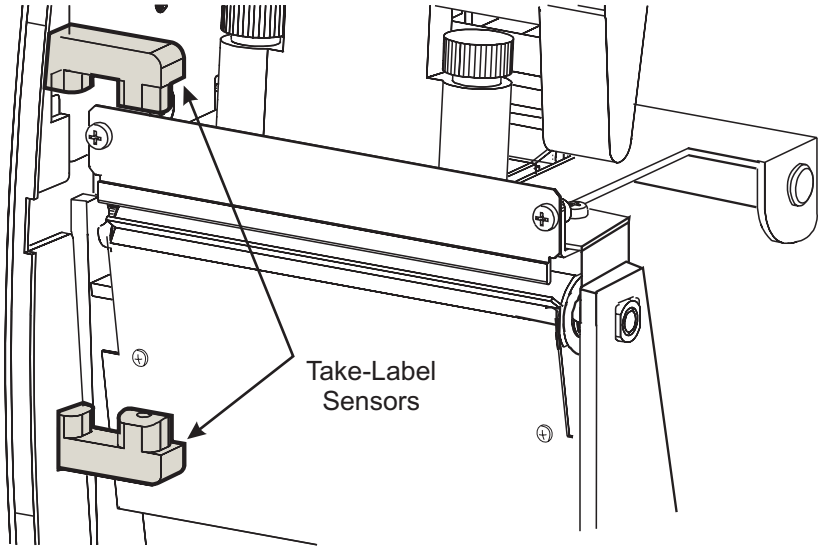

Figure 4-21. Take-Label Sensor Location

Strip-Plate Adjustment

Refer to Figure 4-22. The ribbon strip plate position can be adjusted to provide proper tracking, and separation of the ribbon from the media after printing. If the ribbon does not track properly, or if ribbon wrinkle problems appear adjust the strip plate by following this procedure.

1. Begin printing labels by performing a Pause Key Self Test.
2. Loosen the screws securing the strip plate to the front of the printhead assembly.
3. Position the strip plate for proper ribbon tracking. Ensure the ribbon does not wrinkle, and stays flat, and smooth when fed to the upper ribbon guide when FEED is pressed.

Note • If the strip plate is too high, the result is a noisy operation and possible wrinkle, especially on the backfeed. Smudging or print quality problems result if the strip plate is positioned too low.

4. Tighten the strip plate adjustment screws.
5. Perform another Pause Key Self Test, checking for ribbon wrinkle and proper ribbon tracking. Readjust the strip plate as necessary.
6. If ribbon wrinkle and/or tracking problems persist, check the torque settings of the ribbon take-up spindle as detailed in this section, and adjust the tension as required.

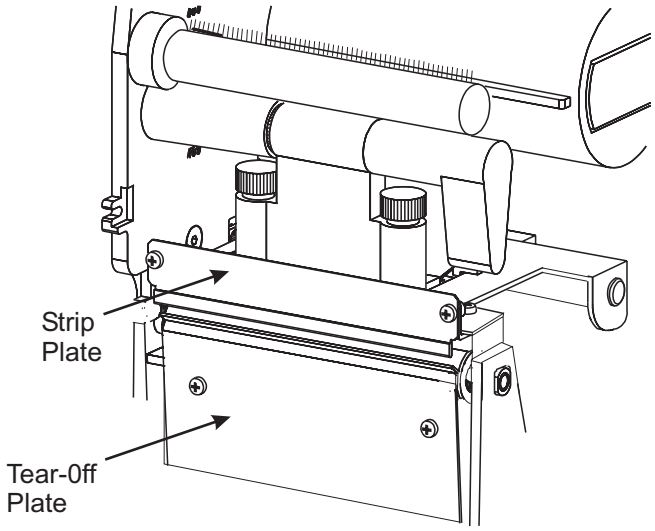

Figure 4-22. Strip Plate Adjustment

Liner Rewind Spindle Adjustment

Refer to Figure 4-23 and follow the procedures below to adjust the liner rewind spindle tension.

1. Turn the printer Off (**O**) and remove all media and ribbon.
2. Tape the end of the 30" long Mylar tape (Zebra part # 01776) to the rewind spindle.
3. Wrap the Mylar strip around the rewind spindle in a clockwise direction.
4. Connect a 1000 gram spring scale to the Mylar strip.
5. Pull the spring scale to create the tension measurement.
6. The rotation of the rewind spindle, created by pulling on the spring scale, should be smooth and similar to the pace of sweep of a clocks second hand. Ensure there is no platen movement when measuring the rewind spindle tension.
7. When the rewind spindle is moving smoothly with even pull, read the tension setting on the spring scale. The correct tension should be 700 grams (+100/–50).
8. If the tension is incorrect, use a pair of utility pliers and hold the locking nut stationary while rotating the rewind spindle until there is easy access to the locking screws.
9. Use a wrench driver to loosen the locking nut screws.
10. Using the utility pliers, turn the nut clockwise to increase tension, and counterclockwise to decrease tension.
11. After achieving the correct tension, tighten the locking screws.
12. Reload the media and ribbon, and test the printer's liner rewind function.

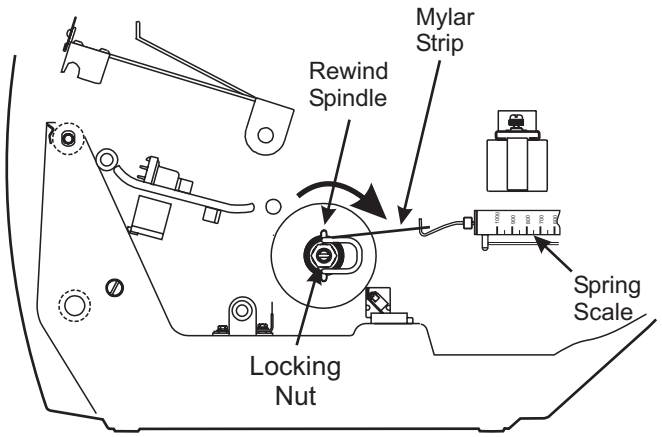

Figure 4-23. Liner Rewind Spindle Adjustment

Electrical Adjustments

Printhead Voltage Adjustment

Caution:

The printhead voltage adjustment is critical to the life of the printhead. Do not use this adjustment to try to increase printing darkness.

When a printhead or power supply board is replaced, the printhead voltage must be adjusted for the proper value. This adjustment provides the voltage applied to the print elements during the printing process.

1. Calculate the proper printhead voltage using the formula or values found in Table 4-4 on page 4-30 for the *S*400 or Table 4-5 on page 4-30 for the *S*600.

Notes • The S400 printhead resistance value can be read from the fork bracket label RXXXX (where XXXX is the value in ohms).

The S600 printhead resistance value can be read from the label on the printhead (R=XXX ohms).

2. Refer to Figure 4-28 on page 4-35. Remove the rear cover.
3. Refer to Figure 4-31 on page 4-39. Attach a voltmeter between F2 and ground on the main logic board.
4. Turn the printer On (**I**), and let it complete the Power On Self Test.
5. Refer to Figure 4-24 on page 4-31. Locate RV2 on the power supply board and adjust until the voltmeter reads the value determined in step 1.

Table 4-4. Printhead Voltage Values (*S*400 Only)

Printhead Voltage Formula: $V = \sqrt{0.78 + (0.49 \times \text{Resistance})}$			
Resistance Ω	**Voltage VDC**	**Resistance Ω**	**Voltage VDC**
935 to 945	22.2	1092 to 1110	24.0
946 to 963	22.4	1111 to 1129	24.2
964 to 981	22.6	1130 to 1148	24.4
982 to 999	22.8	1149 to 1168	24.6
1000 to 1017	23.0	1169 to 1187	24.8
1018 to 1035	23.2	1188 to 1207	25.0
1036 to 1053	23.4	1208 to 1227	25.2
1054 to 1072	23.6	1228 to 1247	25.4
1073 to 1091	23.8	1248 to 1265	25.6

Table 4-5. Printhead Voltage Values (*S*600 Only)

Printhead Voltage Formula: $V = \sqrt{0.78 + (0.673 \times \text{Resistance})}$			
Resistance Ω	**Voltage VDC**	**Resistance Ω**	**Voltage VDC**
680 to 688	22.2	795 to 808	24.0
689 to 701	22.4	809 to 822	24.2
702 to 714	22.6	823 to 836	24.4
715 to 727	22.8	837 to 850	24.6
727 to740	23.0	851 to 864	24.8
741 to 754	23.2	865 to 879	25.0
755 to 767	23.4	880 to 893	25.2
768 to 781	23.6	894 to 908	25.4
782 to 794	23.8	909 to 920	25.6

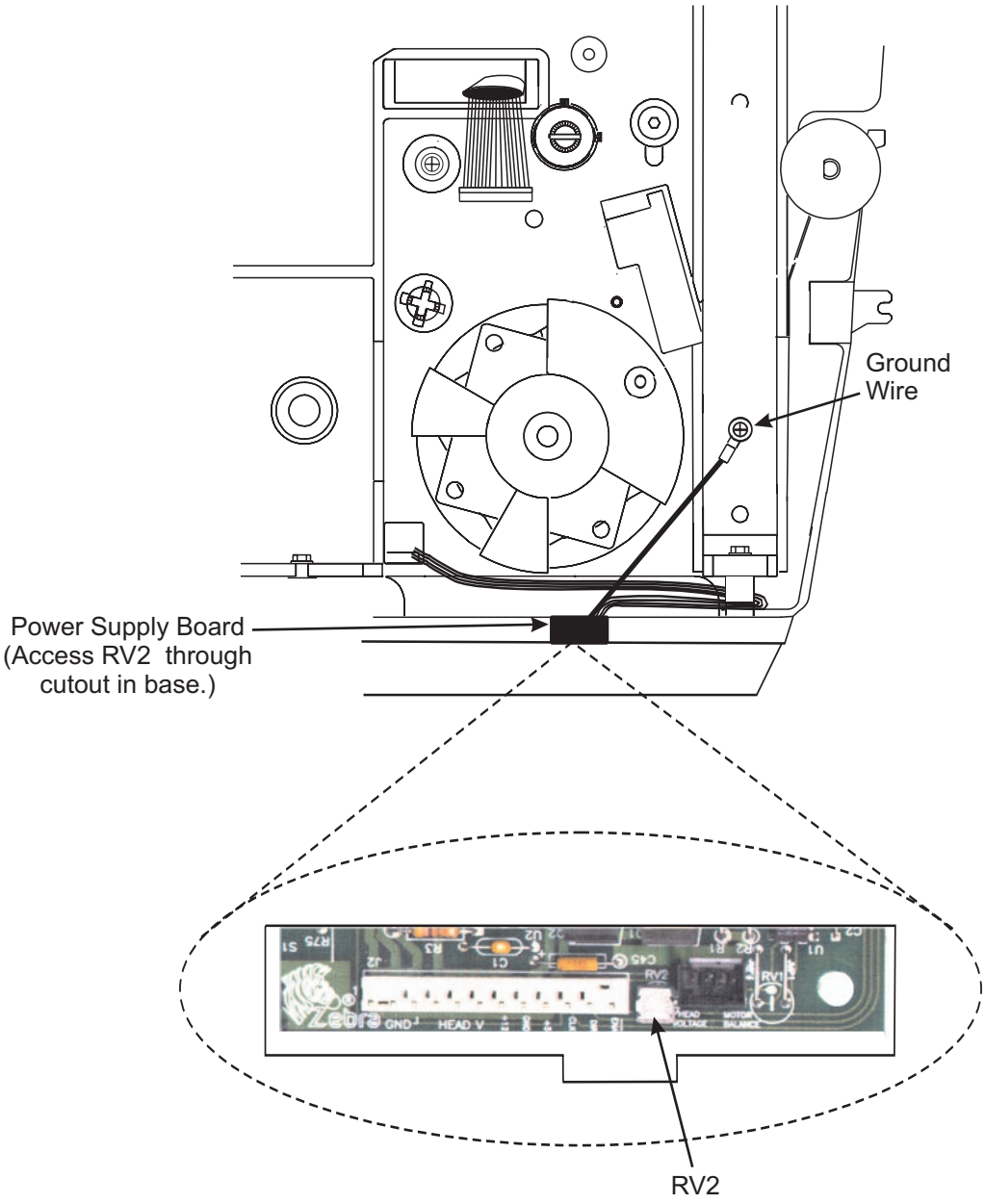

Figure 4-24. Printhead Voltage Adjustment Potentiometer Location

Cutter Voltage Adjustment

Caution:
Use caution around cutter blades. Keep fingers away from blades.

The voltage applied to the printhead is the same voltage applied to the cutter module. The specific voltage applied to the cutter motor is controlled by the home position potentiometer.

There are three cases in which you must adjust the cutter module's home position potentiometer:

- Before placing a new cutter module into service.
- If a new printhead is installed on the printer.
- If a cutter module is installed on a printer other than the one it was previously adjusted for.

1. Turn the printer power Off (**O**). Load media and ribbon if not already installed.
2. Attach the new cutter module to the cutter cable connector on the printer and lay it on the table or on the inside of the printer's open front door.

Note • Do not mount the cutter module at this time.

3. Perform a Pause and Cancel Key test, press, and hold PAUSE and CANCEL while turning the printer On (**I**).

Note • Do not allow the printed labels to pass through the cutter module. Let them accumulate on the table or floor.

4. Refer to Figure 4-25 on page 4-33. While the labels are printing, observe where the sensor disc on the cutter module stops after completing a cut cycle. It can be viewed between the outer cover, and the side plate. The desired stopping position of the censor disc is when the embossed line on the sensor disc is aligned with the edge of the side plate.
5. Refer to Figure 4-26 on page 4-33. Adjust the home position potentiometer with the potentiometer adjustment tool (Zebra part # 01428) until the embossed line on the sensor disc is in alignment with the side plate edge.
6. Turn the power Off (**O**), and install the cutter module.

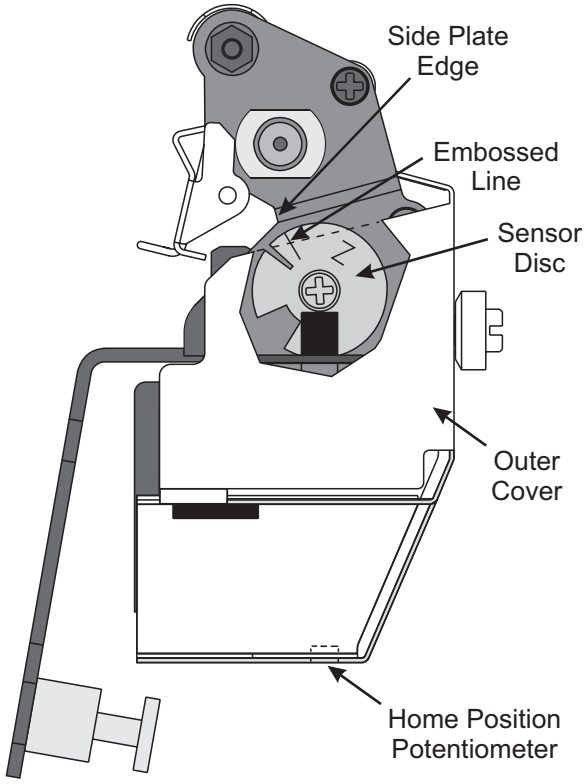

Figure 4-25. Properly Adjusted Cutter Sensor

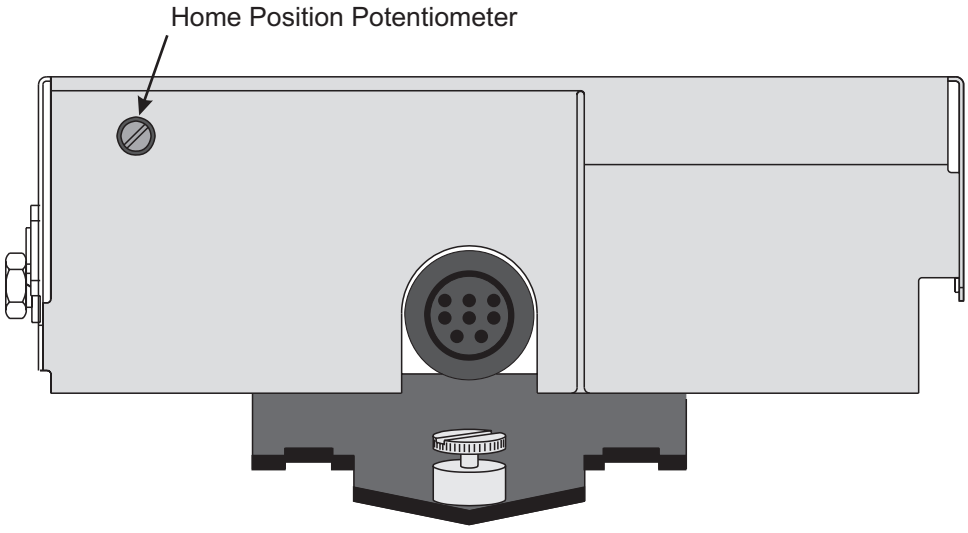

Figure 4-26. Home Position Potentiometer

Corrective Maintenance

Tools Required

Open-End Wrench Set	Spring Scale, 2200 gram and 1000 gram
Metric Allen Wrench Set	0.010" Shim or Feeler Gauge
Small Flat-Blade Screwdrivers	0.020" Shim or Feeler Gauge
Phillips Screwdrivers	Anti-Static Mat
Digital Voltmeter	Anti-Static Wrist Strap

Removing the Main Door

1. Refer to Figure 4-27 on page 4-35. Lift the main door to swing it up and to the left until it rests on top of the right side cover.
2. Using both hands, slide the main door toward the rear of the printer. Lift the end of the main door nearest the front of the printer, pivoting it to the rear and off the main frame.

Removing the Front Door

1. Open the main door.
2. Grasp the tab on top of the front door and carefully pull down until it rests on the desktop.
3. Refer to Figure 4-27 on page 4-35. Notice the front door's hinges in three places on the base of the printer.
4. Grasp the front door near the left and right hinge.
5. Pull the left side away from base while pivoting on the right side.

Removing the Rear Cover

1. Refer to Figure 4-28 on page 4-35. Remove the three cover screws attaching the rear cover to the main frame.
2. Lift the rear cover straight up approximately ½" (12.7 mm) then slide off toward the rear.

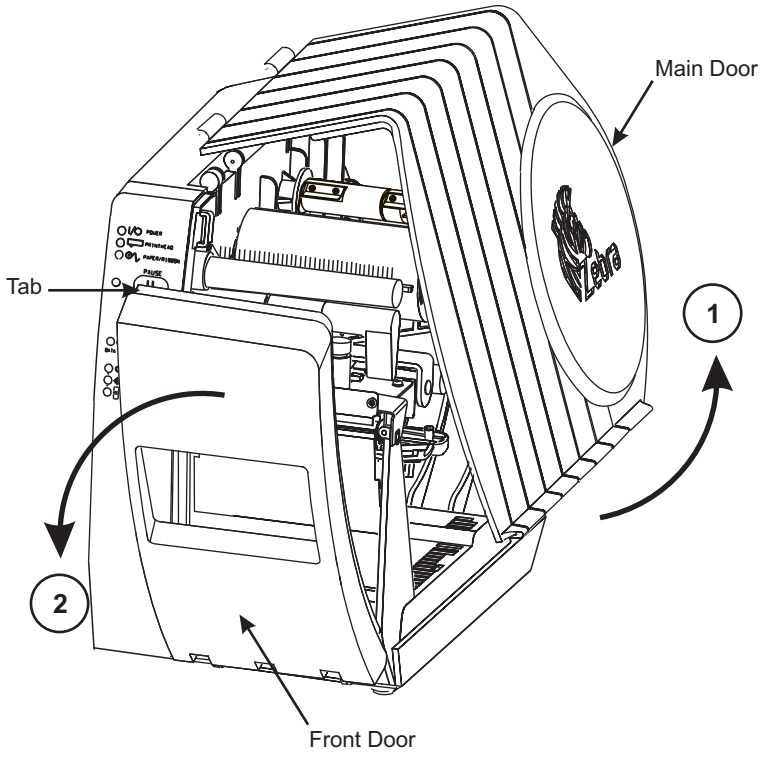

Figure 4-27. Opening Main and Front Doors

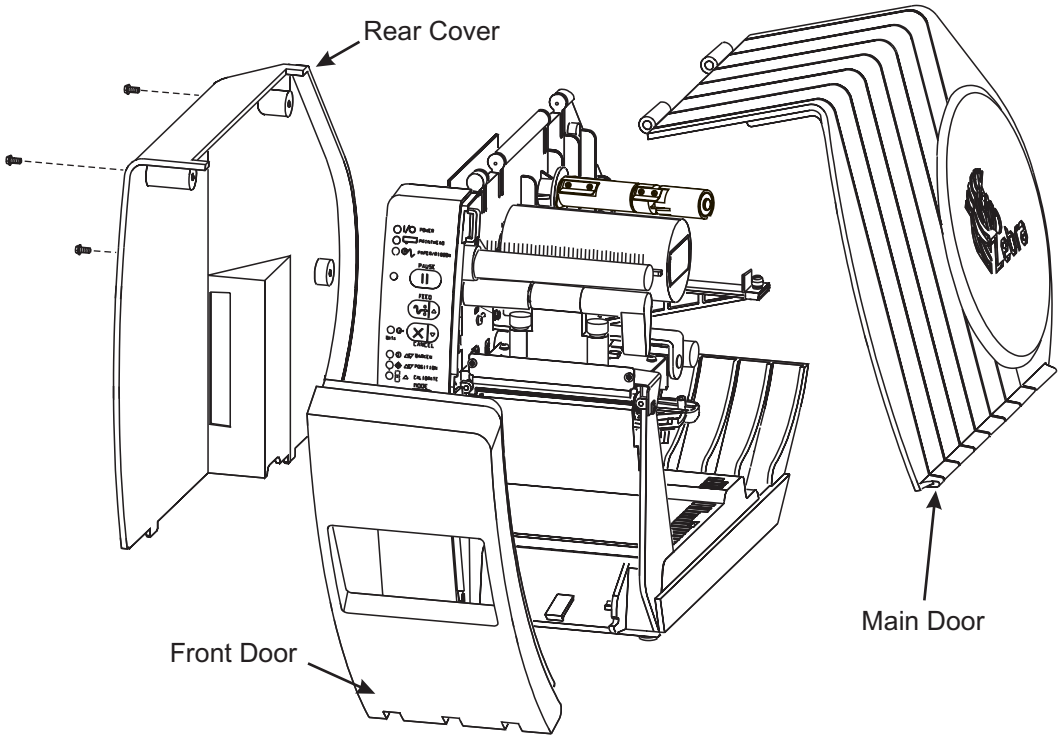

Figure 4-28. Door and Cover Disassembly

Tear-Off Plate Removal

1. Open the main door.
2. Grasp the tab on top of the front door and carefully pull down until it rests on the desktop.
3. Refer to Figure 4-29. Remove the two screws securing the tear-off plate.
4. Push up on the bottom of the tear-off plate, and pull the plate out.
5. Reverse the procedure to replace the tear-off plate.

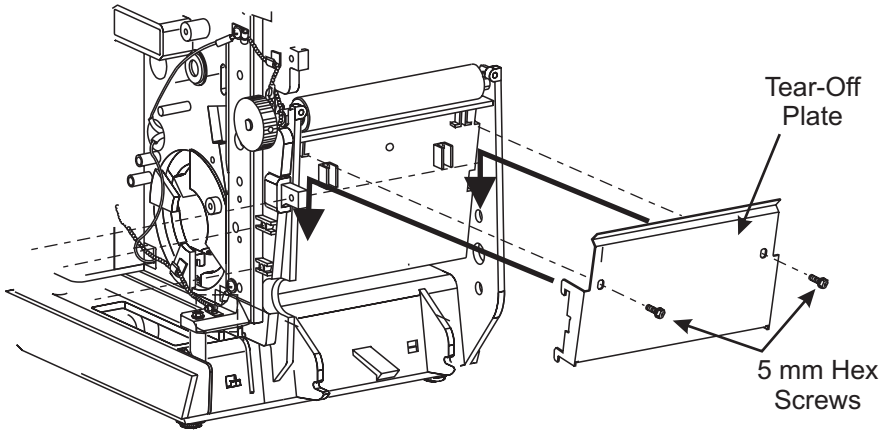

Figure 4-29. Tear-Off Plate

Control Panel Assembly Removal

Caution:

Observe proper electrostatic safety precautions when removing, handling, and replacing printed circuit boards.

1. Turn the power Off (**O**), and remove the AC power cord.
2. Remove the front door.
3. Remove the rear cover.
4. Refer to Figure 4-30 on page 4-37. Remove the screw securing the control panel assembly.
5. Remove the screw that secures the ribbon cable strain relief to the main frame.
6. Refer to Figure 4-31 on page 4-39. Detach the control panel ribbon cable from the main logic board (J12).
7. Grasp the control panel assembly by its sides and carefully lift it out of the base guide slots.

Control Panel Circuit Board Replacement

1. Turn the printer Off (**O**), and remove the AC power cord.
2. Remove the control panel assembly.
3. Refer to Figure 4-30. Remove the control panel board from the control panel cover by removing the two mounting screws.
4. Carefully align the replacement board over the mounting holes on the control panel cover and reinstall the two mounting screws.
5. Remount the control panel assembly in the base guide slots and secure into the main frame by reinstalling the mounting screw.
6. Refer to Figure 4-31 on page 4-39. Reattach the control panel ribbon cable to the main logic board (J12).
7. Reinstall the ribbon cable strain relief to the main frame.
8. Reinstall the rear cover, and front door.

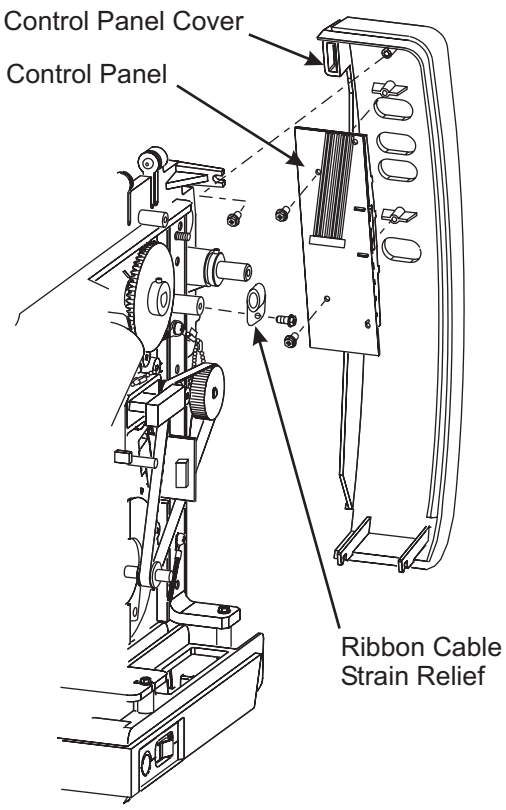

Figure 4-30. Control Panel Assembly

Main Logic Board Removal

Caution:

Observe proper electrostatic safety precautions when removing, handling, and replacing printed circuit boards.

1. Turn printer Off (**O**), and remove the AC power cord.
2. Remove the printer data cable.
3. Remove the rear cover.
4. Refer to Figure 4-31 on page 4-39. Note the position of all ribbon cable connectors and wire harness connectors. Remove all connectors to the main logic board.
5. Remove the three screws securing the main logic board.
6. Carefully grasping both sides of the main logic board, pull the board straight up from the power supply connector and out of the unit. A gentle rocking motion may be necessary to release it from the power supply board.

Main Logic Board Installation

1. Refer to Figure 4-31 on page 4-39. Align connector (J8) at the bottom of the main logic board with the mating power supply board connector (J2).
2. Press the main logic board straight down until connector J8 has seated completely onto the power supply board.
3. Reinstall the three mounting screws, making sure the mounting screw in the upper right-hand side of the main logic board goes through the braided ground strap first.
4. Reconnect all ribbon and wire harness cables.
5. Replace the rear cover.

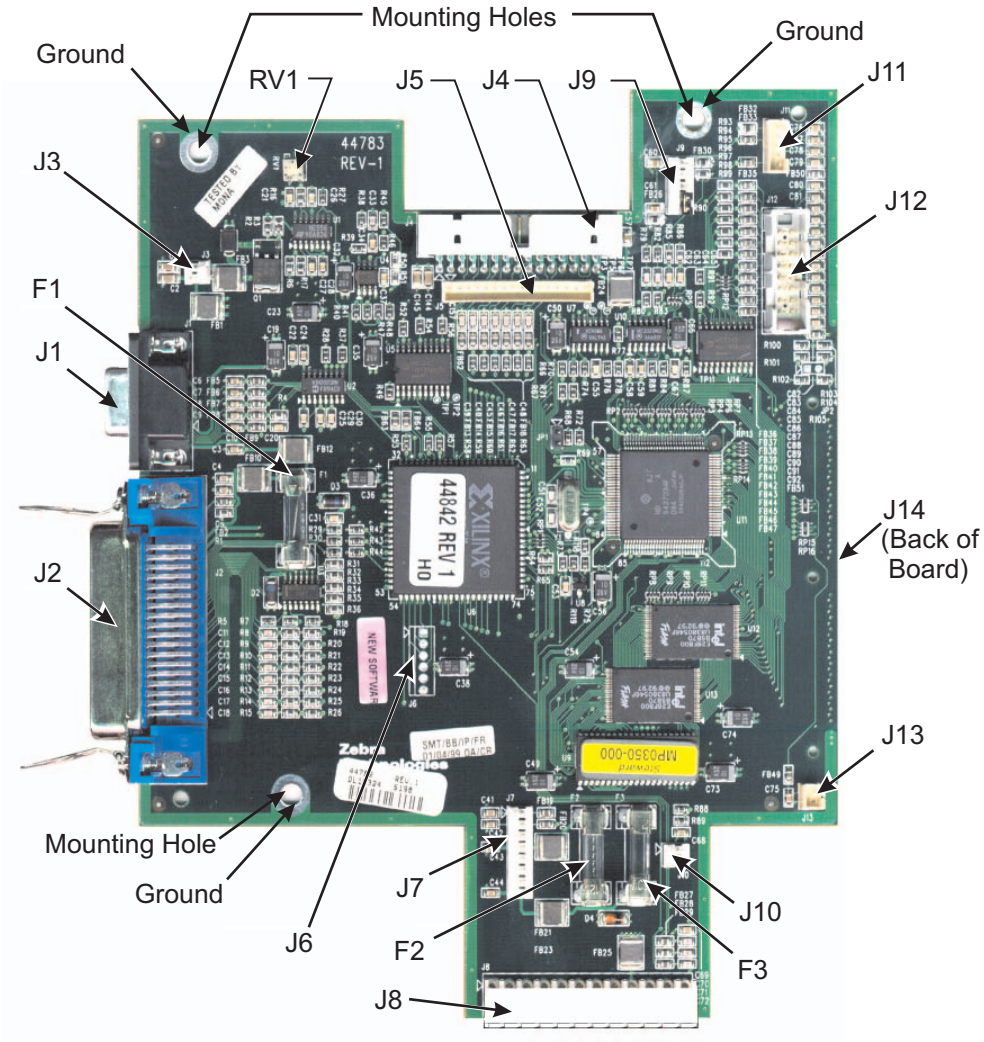

Figure 4-31. Main Logic Board

J1	Serial Port	J10	Full Roll Switch Assembly
J2	Parallel Port	J11	Media/Ribbon Sensor Assembly
J3	Ribbon Take-Up Motor Assembly	J12	Control Panel Assembly
J4	Printhead Assembly (S600)	J13	Not Used
J5	Printhead Assembly (S400)	J14	Option Connector (on back of board)
J6	Not Used	RV1	Spindle Tension Adjustment
J7	Cutter Assembly	F1	5 MF 2A/250V
J8	Power Supply Assembly	F2	E 5A/125V
J9	Label Available Sensor Assembly	F3	E 250mA/125V

Downloading Firmware

To download the correct version of firmware go to: www.zebra.com/firmware and choose the your printer model. Choose a version from the firmware matrix and follow the directions.

Or call: USA: 1-847.913.2259 Europe: 44 (0) 1494 536644.

Print Mechanism Assembly Removal

1. Turn printer Off (**O**), and remove the AC power cord.
2. Remove the printer data cable.
3. Remove the media and ribbon.
4. Remove the main door, front door, and rear cover.
5. Remove the main logic board.
6. Refer to Figure 4-31 on page 4-39, and locate the printhead cable (J4 or J5).
7. Refer to Figure 4-32. Remove the ferrite assembly from around the printhead cable by sliding the clips off of the ferrites.
8. Rotate the head-open lever counterclockwise to remove the pressure on the printhead.
9. Refer to Figure 4-33 on page 4-42. Locate the braided ground straps, on the print mechanism assembly, that lead to the main frame and to the riot bar on the electronics side of the printer. Remove the screws securing the braided ground strap to the main frame.
10. Refer to Figure 4-34 on page 4-42. Remove the single screw with two washers on the electronics side of the printer securing the print mechanism assembly to the main frame and riot bar.
11. Carefully slide the printhead cable through the cutout in the main frame and remove the printhead assembly.
12. Reverse the procedures to reinstall the print mechanism assembly.
13. Test the unit and perform a printhead position adjustment if necessary.

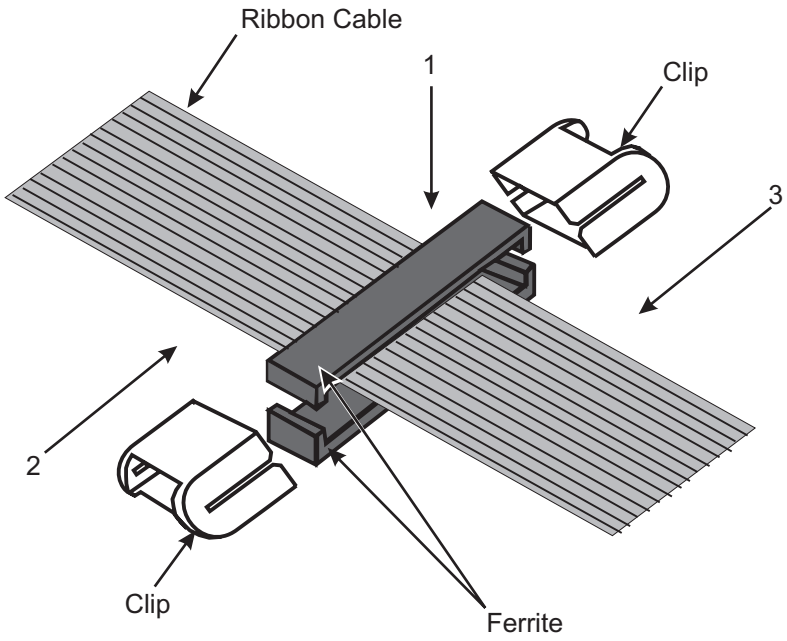

Figure 4-32. Printhead Cable Ferrite assembly

Printhead Assembly Removal and Installation

1. Turn printer Off (**O**), and remove the AC power cord.
2. Remove the printer data cable.
3. Remove the main door, front door, and rear cover.
4. Refer to Figure 4-22 on page 4-27. Remove the two screws securing the strip plate.
5. Rotate the head-open lever counterclockwise to remove the pressure on the printhead.
6. Refer to Figure 4-35 on page 4-43. Using an open-end wrench, remove the two nuts securing the printhead assembly to the print mechanism assembly.

Note • Do not remove, loosen or adjust the two screws on top of the printhead assembly. They are used only when a printhead alignment is necessary.

7. Carefully remove the printhead cable from the printhead assembly.
8. Install the replacement printhead assembly by reversing steps 4 through 7.

Notes • When installing the printhead cable to the printhead assembly, ensure the insulation sleeve is pushed as far forward (toward the printhead assembly) as possible.

Do not remove, loosen or adjust the two screws on top of the replacement printhead assembly. They are used only when a printhead alignment is necessary.

9. Reconnect the AC power cord.
10. Perform a voltage calibration as described in "Printhead Voltage Adjustment" on page 4-29.

Caution:

The printhead voltage adjustment is critical to the life of the printhead. Do not use this adjustment to try to increase the printing darkness.

---

11. Print test labels to determine print quality. Adjust the strip plate as described in, "Strip-Plate Adjustment" on page 4-27, only if experiencing ribbon wrinkle or if the ribbon is not tracking properly. Adjust the printhead as described in. "Printhead Position Adjustment" on page 4-23, only if necessary (replacement printheads are pre-aligned at the factory).

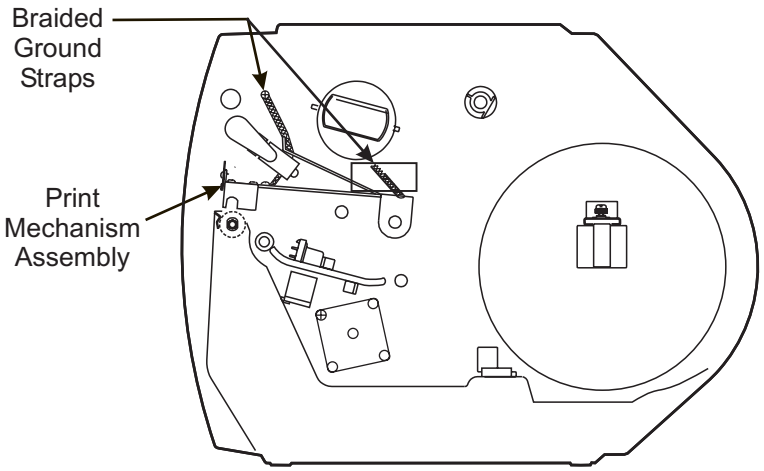

Figure 4-33. Braided Ground Strap Location

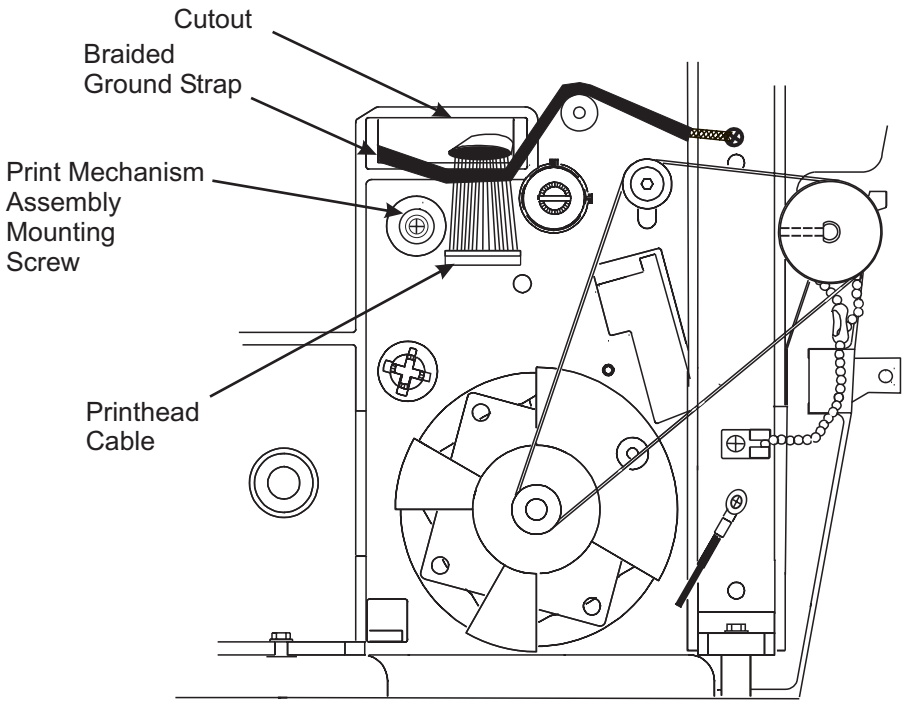

Figure 4-34. Print Mechanism Assembly Mounting Screw Location

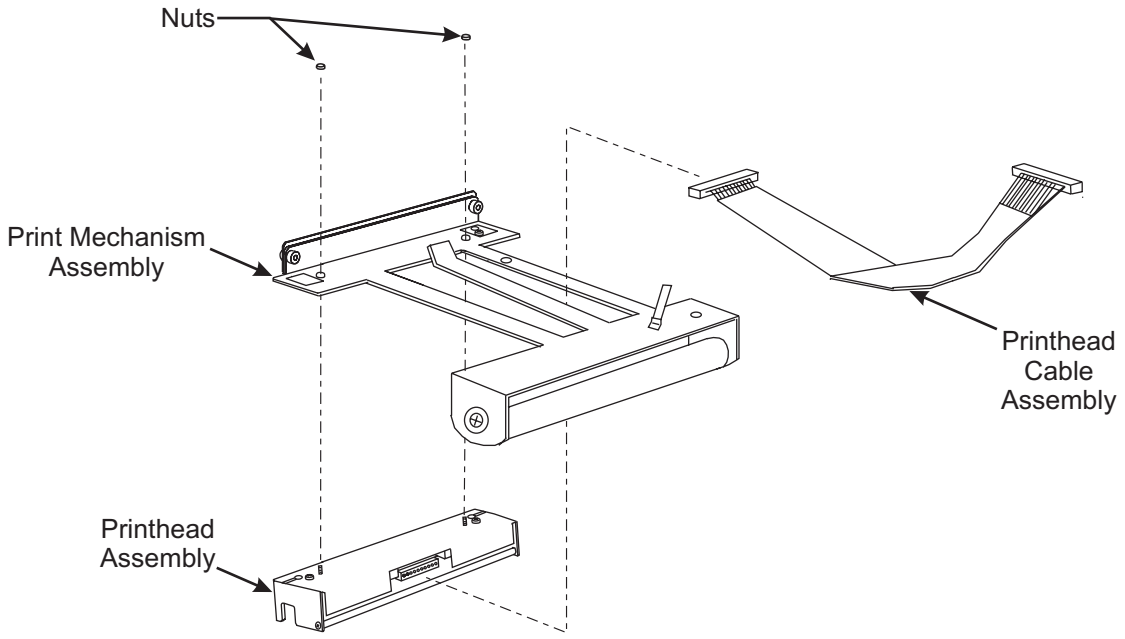

Figure 4-35. Printhead Assembly Removal/Installation

Ribbon Supply Spindle Disassembly

Refer to Figure 4-36.

1. Turn printer Off (**O**), and remove the AC power cord.
2. Remove the printer data cable.
3. Remove any media and ribbon.
4. Ensure the dual-tension ribbon supply spindle outer spindle is in the retracted (pushed in) position to gain access to the set screws.
5. Rotate the outer spindle to locate and loosen the two set screws securing the cup and spring assembly to the ribbon supply spindle shaft.
6. Slide the cup and spring assembly and the outer spindle off the shaft.
7. Remove the C-clip.
8. Slide the spindle assembly off the shaft.
9. Rotate the ribbon supply spindle subassembly to locate and loosen the two set screws securing the cup and spring assembly to the ribbon supply spindle shaft.
10. Slide the ribbon supply spindle subassembly off the shaft.

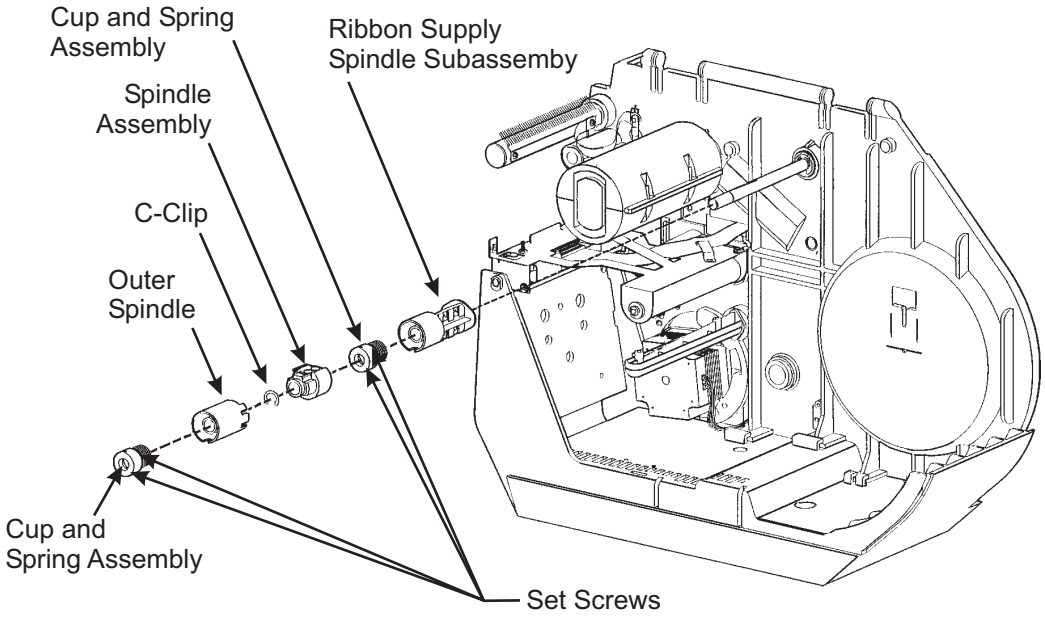

Figure 4-36. Dual-Tension Ribbon Supply Disassembly

Ribbon Supply Spindle Installation

1. Use an emery cloth to remove burrs and nicks on the ribbon supply spindle shaft.
2. Refer to Figure 4-37. Slide the ribbon supply spindle subassembly on the ribbon supply spindle shaft.
3. Slide one of the cup and spring assemblies on the ribbon supply spindle shaft.
4. Place a 0.010" (.254 mm) shim or feeler gauge between the C-clip and ribbon supply spindle subassembly.
5. While applying light pressure against the cup and spring assembly, tighten the two set screws on the cup and spring assembly.

Note • Rotate the ribbon supply spindle subassembly to access the set screws.

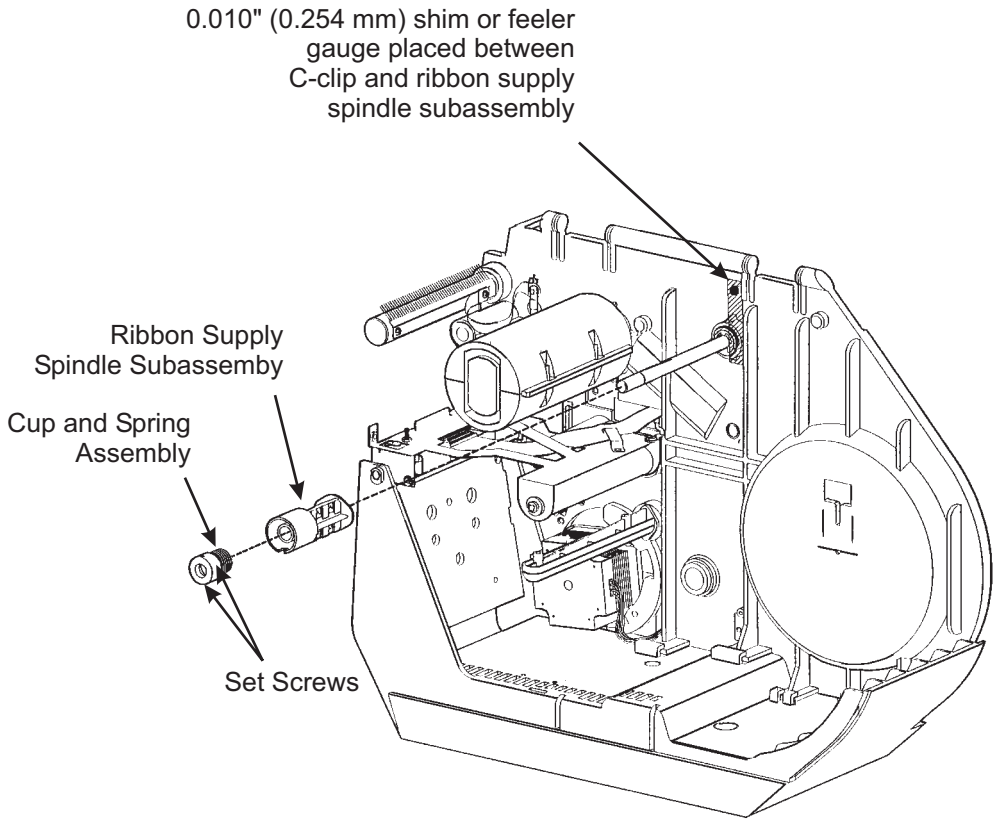
0.010" (0.254 mm) shim or feeler gauge placed between C-clip and ribbon supply spindle subassembly
Ribbon Supply Spindle Subassemby
Cup and Spring Assembly
Set Screws

Figure 4-37. Ribbon Supply Spindle Subassembly Installation

6. Once the cup and spring assembly is tightened, remove the shim/feeler gauge. The ribbon supply spindle subassembly should have some “play” on the shaft. When rotated counterclockwise, the ribbon supply spindle subassembly spins freely until it encounters the spring. Continuing to turn the ribbon supply spindle subassembly counterclockwise produces a “snap,” and the ribbon supply spindle subassembly moves freely.

7. When rotated clockwise, the ribbon supply spindle subassembly encounters the spring and attempts to spin the ribbon supply spindle subassembly counterclockwise.
8. If the results in steps 6 and 7 are not achieved, repeat steps 2 through 7.
9. Refer to Figure 4-38. Slide the spindle assembly onto the shaft.

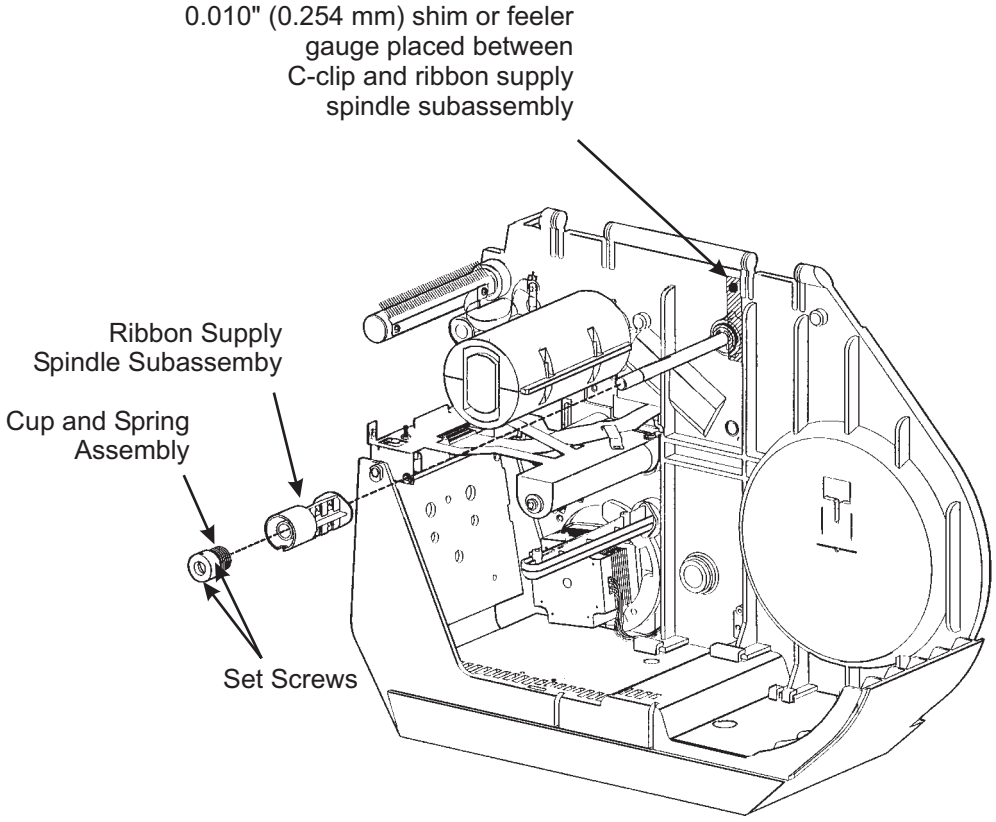
0.010" (0.254 mm) shim or feeler gauge placed between C-clip and ribbon supply spindle subassembly
Ribbon Supply Spindle Subassemby
Cup and Spring Assembly
Set Screws

Figure 4-38. Spindle Assembly Installation

10. Refer to Figure 4-39 on page 4-48. Reinstall the C-clip in the groove on the shaft.
11. Place a 0.020" (0.508 mm) shim or feeler gauge between the spindle assembly and the ribbon supply spindle subassembly.
12. Slide the outer spindle on the shaft.
13. Align the large notch on the outer spindle with the corresponding protrusion on the spindle assembly. The protrusion on the spindle assembly is in line with the metal core clip.
14. Carefully slide the outer spindle on to the spindle assembly to the first notch.
15. Refer to Figure 4-41 on page 4-48. If it is pushed on too far, simply pull the outer spindle away from the spindle assembly until it looks like Figure 4-40 on page 4-48.
16. Slide the cup and spring assembly on the shaft.
17. While applying light pressure against the cup and spring assembly, and with the 0.020 shim or feeler gauge between the spindle assembly and the ribbon supply spindle sub-assembly, tighten the two set screws on the cup and spring assembly.

Note • Rotate the outer spindle to access the set screws.

18. Once the cup and spring assembly is tightened, remove the shim/feeler gauge. The outer spindle and spindle assembly should have some “play” on the shaft. When rotated counterclockwise, the outer spindle and spindle assembly spins freely until it encounters the spring. Continuing to turn the outer spindle and spindle assembly counterclockwise produces a “snap,” and the ribbon supply spindle subassembly moves freely.
19. Rotating in a clockwise direction, the outer spindle and spindle assembly encounter the spring and attempt to spin the outer spindle and spindle assembly in the counterclockwise direction.
20. Push in the outer spindle until it is flush against the spindle assembly. The outer spindle and spindle assembly should now spin freely clockwise and counterclockwise with no restrictions.
21. If the results in steps 17, 18, and 19 are not achieved, repeat steps 9 through 19.
22. Replace the printer data cable and AC power cord.
23. Reload media and ribbon, and test the printer operation.

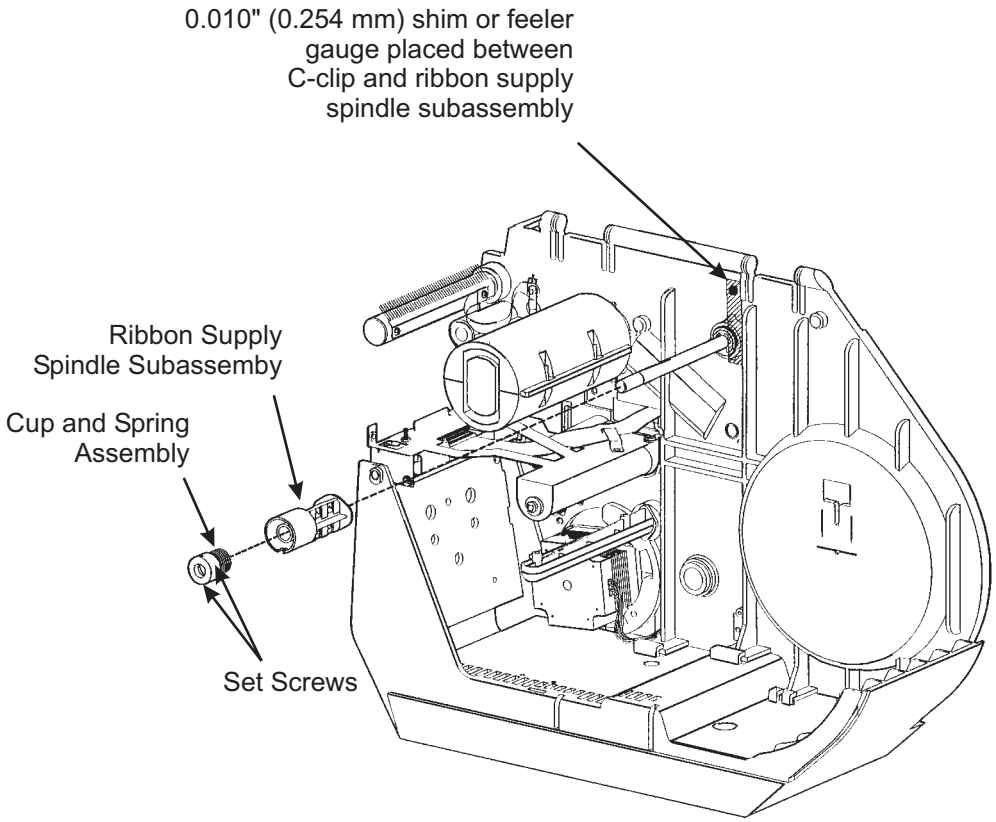
0.010" (0.254 mm) shim or feeler gauge placed between C-clip and ribbon supply spindle subassembly
Ribbon Supply Spindle Subassemby
Cup and Spring Assembly
Set Screws

Figure 4-39. Spindle Assembly Installation

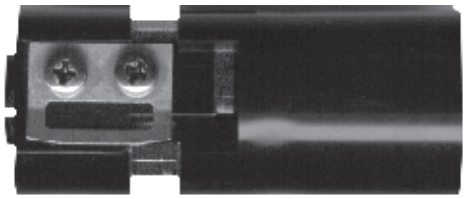

Figure 4-40. Spindle Assembly & Outer Spindle (Expanded)

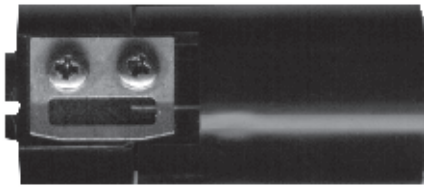

Figure 4-41. Spindle Assembly & Outer Spindle (Retracted)

Media Sensor Assembly Removal

Caution:
Observe proper electrostatic safety precautions when removing, handling, and replacing printed circuit boards.

1. Turn printer Off (**O**), and remove the AC power cord and the printer data cable.
2. Remove media and ribbon.
3. Remove the main door and rear cover.
4. Refer to Figure 4-31 on page 4-39. Disconnect the wiring harness from J11 on the main logic board.
5. Refer to Figure 4-42 on page 4-50. Slide out the upper media guide assembly.
6. Locate the two mounting screws securing the media sensor assembly to the main frame.
7. Using a long-reach magnetic tip screwdriver, remove the two mounting screws.
8. Remove the media sensor assembly.

Media Sensor Assembly Installation

1. Remove the wiring harness from W1 on the media sensor board and connect it to W1 on the replacement board.
2. Install the media sensor assembly on to the main frame, ensuring the wiring harness attached to W1 on the media sensor board is threaded through the cutout in the main frame.
3. Using a long-reach magnetic tip screwdriver, carefully reinstall the two mounting screws.
4. Refer to Figure 4-31 on page 4-39. Reconnect the wiring harness from the media sensor board to J11 on the main logic board.
5. Refer to Figure 4-42 on page 4-50. Reinstall the upper media guide assembly.
6. Reinstall the media and ribbon.
7. Reinstall the main door and rear cover.
8. Reconnect the AC power cord and data cable.
9. Turn the printer On (**I**), and recalibrate the media. Verify proper printer operation.

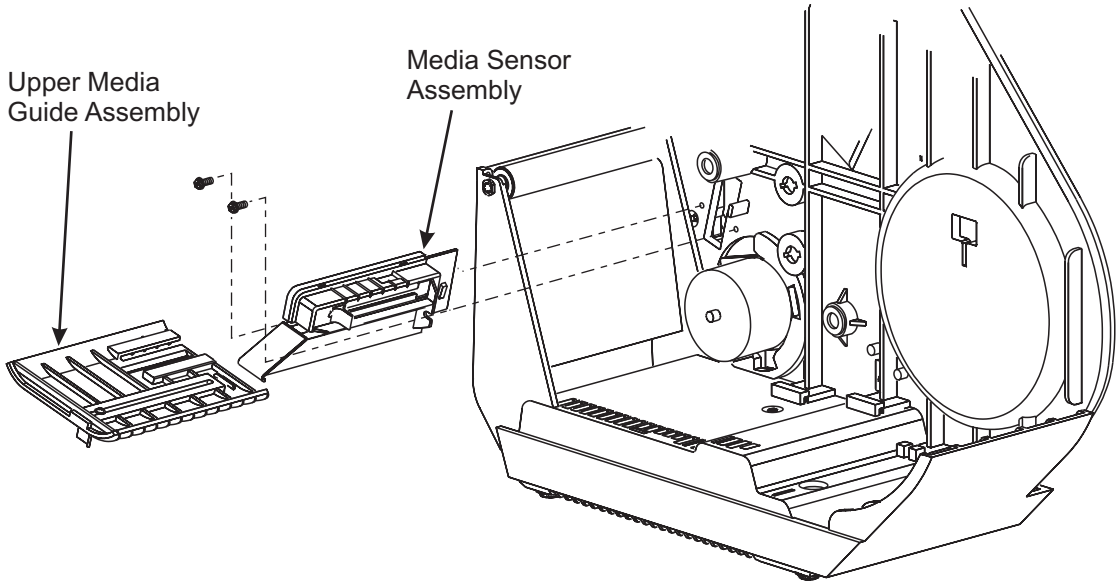

Figure 4-42. Media Sensor Assembly

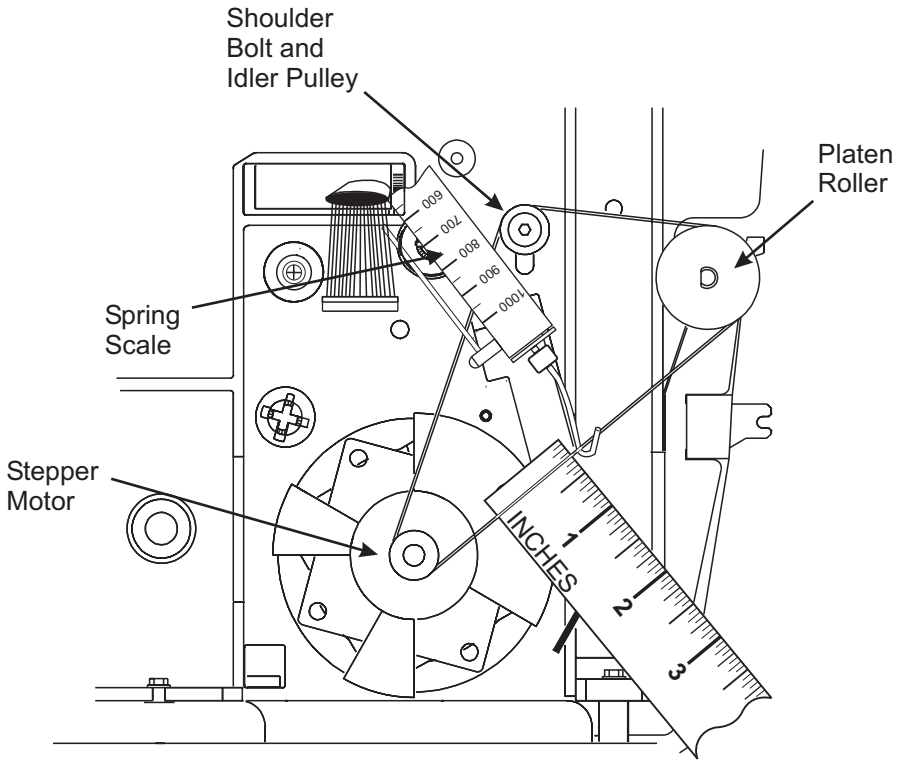

Figure 4-43. Main Drive Belt Replacement and Adjustment

Main Drive Belt Removal, Replacement, and Adjustment

Printers without the Peel-Off Option

Caution:
Observe proper electrostatic safety precautions when removing, handling, and replacing printed circuit boards.

1. Turn printer Off (**O**), and remove the AC power cord and the printer data cable.
2. Remove media and ribbon.
3. Remove the main door and rear cover.
4. Remove the main logic board and media sensor assembly.

Note • Scribing a mark into the printer main frame indicating the position of the idler pulley prior to performing the next step may help when adjusting the belt tension.

5. Refer to Figure 4-43 on page 4-50. Loosen the shoulder bolt holding the idler pulley in position until the pulley freely moves up and down.
6. Remove the main drive belt and install the new one.
7. Hook a 1000 gram spring scale to the belt as shown in Figure 4-43 on page 4-50, and carefully pull up on the idler pulley to increase belt tension.
8. When a scale reading of 500 grams ± 100 grams creates a deflection of ¼" (6.4 mm), tighten the shoulder bolt.
9. Reinstall the media sensor assembly, main logic board, main door, and rear cover.
10. Reload media and ribbon.
11. Reconnect the AC power cord and data cable. Turn the printer On (**I**), and test for proper operation.

Printers Equipped With the Peel-Off Option

Caution:
Observe proper electrostatic safety precautions when removing, handling, and replacing printed circuit boards.

1. Turn the printer Off (**O**), and remove the AC power cord and the printer data cable.
2. Remove media and ribbon.
3. Remove the main door and rear cover.
4. Remove the main logic board and media sensor assembly.

Note • Scribing a mark into the main frame indicating the position of the idler pulley prior to performing the next step may help when adjusting the belt tension.

5. Refer to Figure 4-44. For the particular belt being replaced, loosen the shoulder bolt holding the idler pulley in position until the pulley freely moves up and down.
6. Remove the main drive belt and/or rewind spindle drive belt and install the new one.
7. Hook a 2200 gram spring scale to the new main drive or rewind spindle drive belt, dependant on which one is being replaced/adjusted, and carefully pull up on the idler pulley to increase belt tension.
8. **Main Drive Belt Adjustment**. When a scale reading of 900 grams (± 225 grams) creates a deflection of ¼" (6.4 mm), tighten the shoulder bolt.
9. **Rewind Spindle Drive Belt Adjustment**. When a scale reading of 1800 grams (± 225 grams) creates a deflection of ¼" (6.4 mm), tighten the shoulder bolt.
10. Reinstall the media sensor assembly, main logic board, main door, and rear cover.
11. Reload media and ribbon.
12. Reconnect the AC power cord and data cable. Turn the printer On (**I**), and test for proper operation.

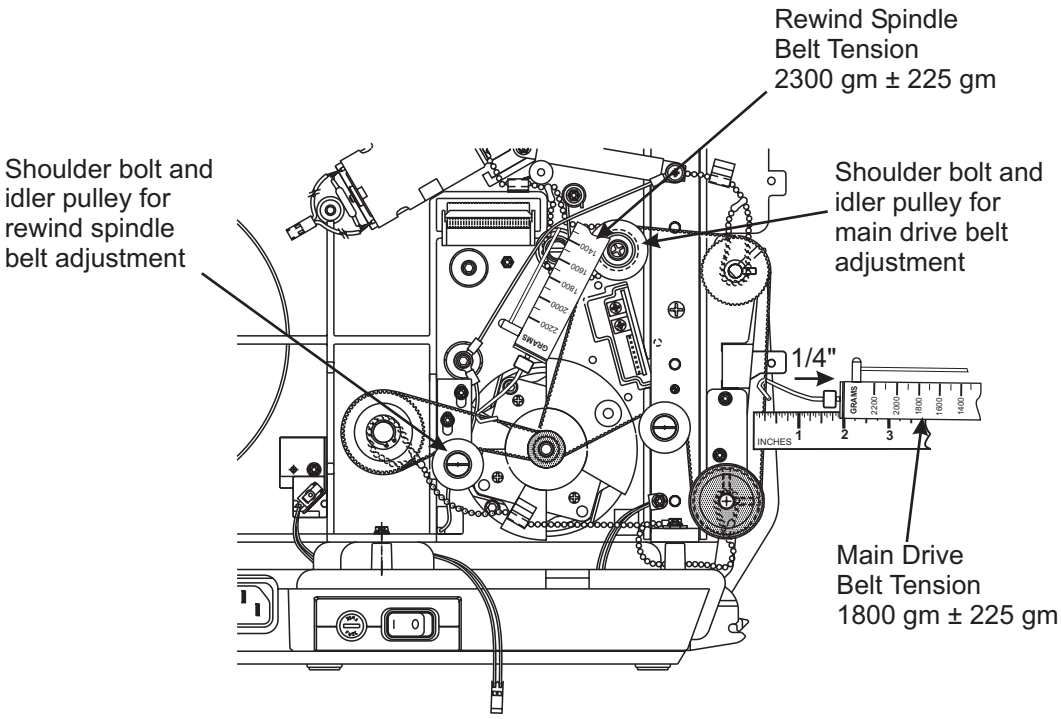

Figure 4-44. Peel-Off Drive Belt Adjustment

Platen Roller Replacement

1. Turn the printer Off (**O**), and remove the AC power cord and the data cable.
2. Remove media and ribbon.
3. Remove the main door, rear cover, and control panel assembly.
4. Remove the main logic board and media sensor assembly.

Note • Scribing a mark into the main frame indicating the position of the idler pulley prior to performing step 5 may help when adjusting the belt tension.

5. Refer to Figure 4-45 on page 4-54. Loosen the shoulder bolt holding the idler pulley in position until the pulley freely moves up and down.
6. Remove the main drive belt.
7. Remove the screw securing the platen roller ground chain assembly to the main frame.
8. Refer to Figure 4-29 on page 4-36. Remove the tear-off plate.
9. Remove the platen roller by lifting up on the end with the platen pulley and pivoting the platen bearings out of the slots.
10. Remove the platen pulley from the platen roller.
11. Install the platen bearings, nylon spacer washers, ground chain assembly, and the platen pulley on the replacement platen roller as shown in Figure 4-45.

Note • Refer to Figure 4-46 on page 4-54. Ensure the platen bearings are oriented with the off-center holes at the top when installed.

12. Reinstall the platen roller by sliding the outside platen bearing into its cutout and dropping the inside platen bearing into its slot.
13. Reattach the ground chain assembly to the main frame.
14. Reinstall the main drive belt.
15. Adjust the main drive belt tension.
16. Reinstall the main logic board and media sensor assembly.
17. Reinstall the tear-off plate, control panel assembly, rear cover, and main door.
18. Reload media and ribbon.
19. Reconnect AC power cord and data cable. Turn the printer On (**I**), and test for proper operation.

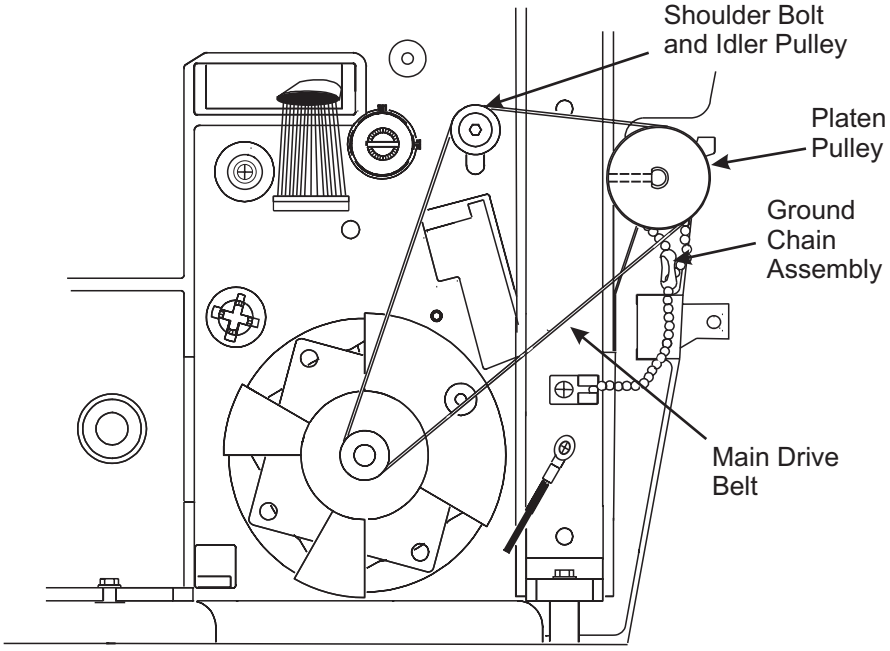

Figure 4-45. Platen Roller Replacement

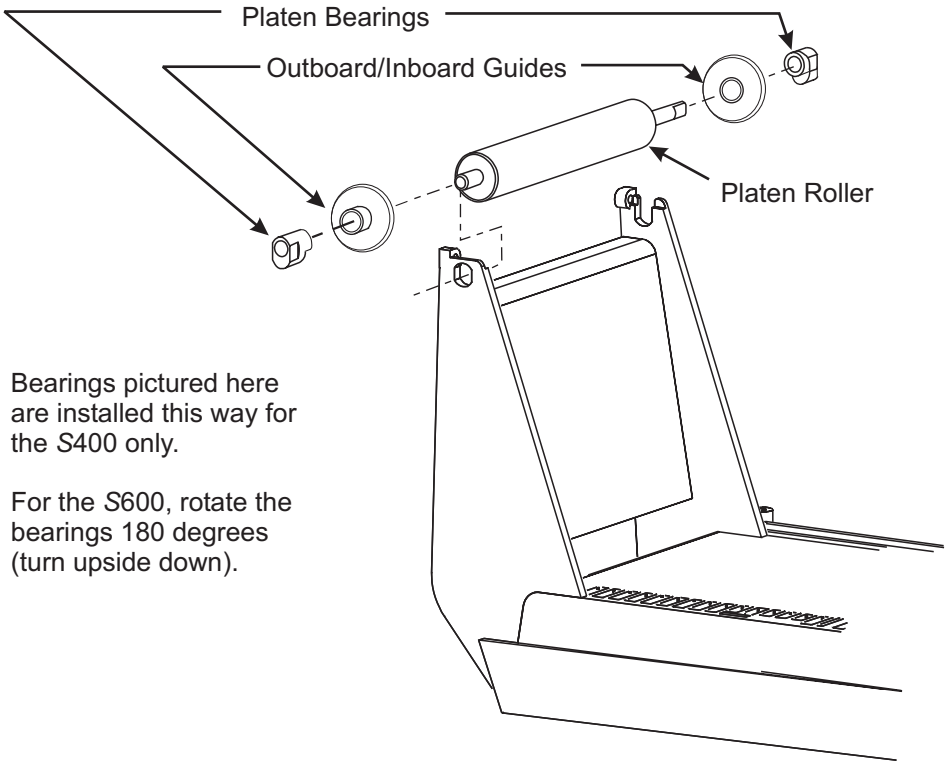

Figure 4-46. Replacing the Platen Roller

Ribbon Take-Up Motor Replacement

1. Turn the printer Off (**O**), and remove the AC power cord and the data cable.
2. Remove media and ribbon.
3. Remove the main door and rear cover.
4. Remove the main logic board.
5. Remove the main drive belt.
6. Refer to Figure 4-47 on page 4-55. Loosen the two screws and slide the bevel gear from the ribbon take-up spindle shaft.
7. Remove the ground chain assembly from around the idler pulley.
8. Remove the screw securing the ground chain assembly to the ribbon supply spindle shaft.
9. Remove the two screws securing the ribbon tension motor assembly and mounting bracket to the main frame.
10. Install the replacement ribbon tension motor assembly by reversing steps 6 through 9.
11. Perform a main drive belt tension adjustment.
12. Reinstall the main logic board, rear cover, and main door.
13. Perform the ribbon take-up spindle tension adjustment.
14. Reinstall the media and ribbon.
15. Reconnect the AC power cord and data cable. Turn the printer On (**I**), and test for proper operation.

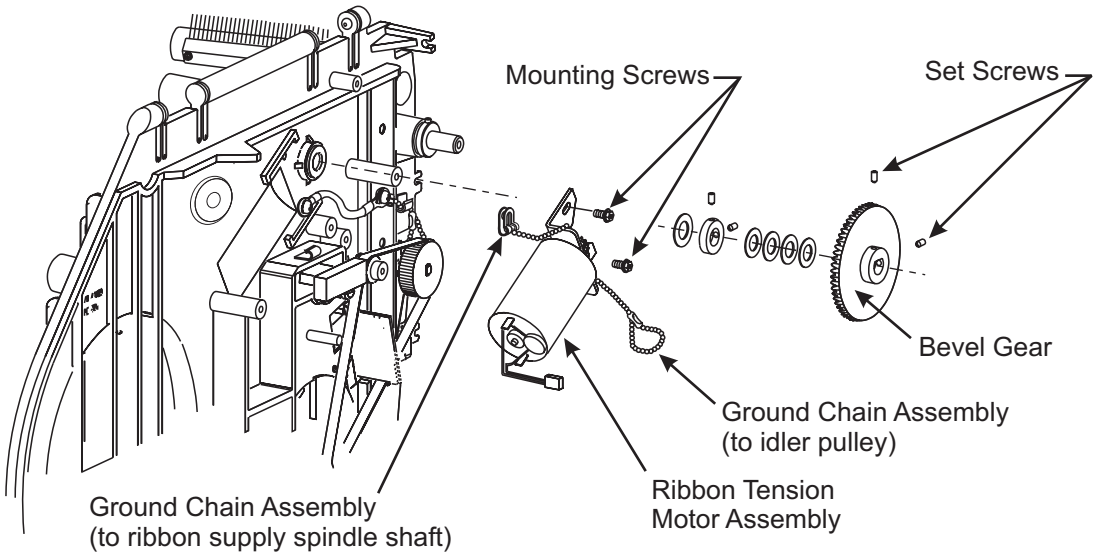

Figure 4-47. Ribbon Take-Up Motor

Stepper Motor Replacement

1. Turn the printer Off (**O**), and remove the AC power cord and data cable.
2. Remove media and ribbon.
3. Remove the main door and rear cover.
4. Remove the main logic board.
5. Remove the main drive belt.
6. Refer to Figure 4-48. Remove the screw, underneath the upper media guide assembly, holding the stepper motor to the main frame.
7. Refer to Figure 4-49 on page 4-57. Disconnect the stepper motor cable (J1) from the power supply board.
8. Carefully grasping the stepper motor, turn it counterclockwise and remove it from the slots.
9. Reverse steps 6 through 8 to install the replacement stepper motor.
10. Replace the main drive belt and adjust the tension.
11. Replace the main logic board.
12. Replace the rear cover and main door.
13. Reload media and ribbon.
14. Reconnect the AC power cord and data cable. Turn the printer On (**I**), and test for proper operation.

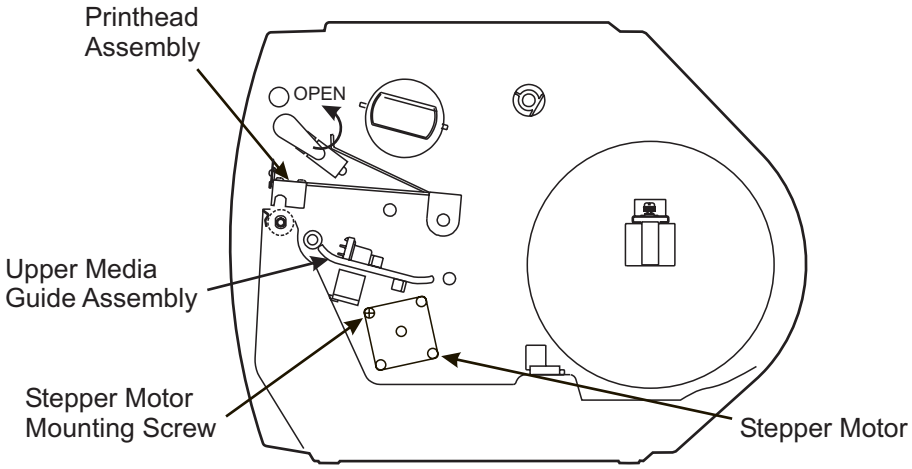

Figure 4-48. Stepper Motor (Media Side)

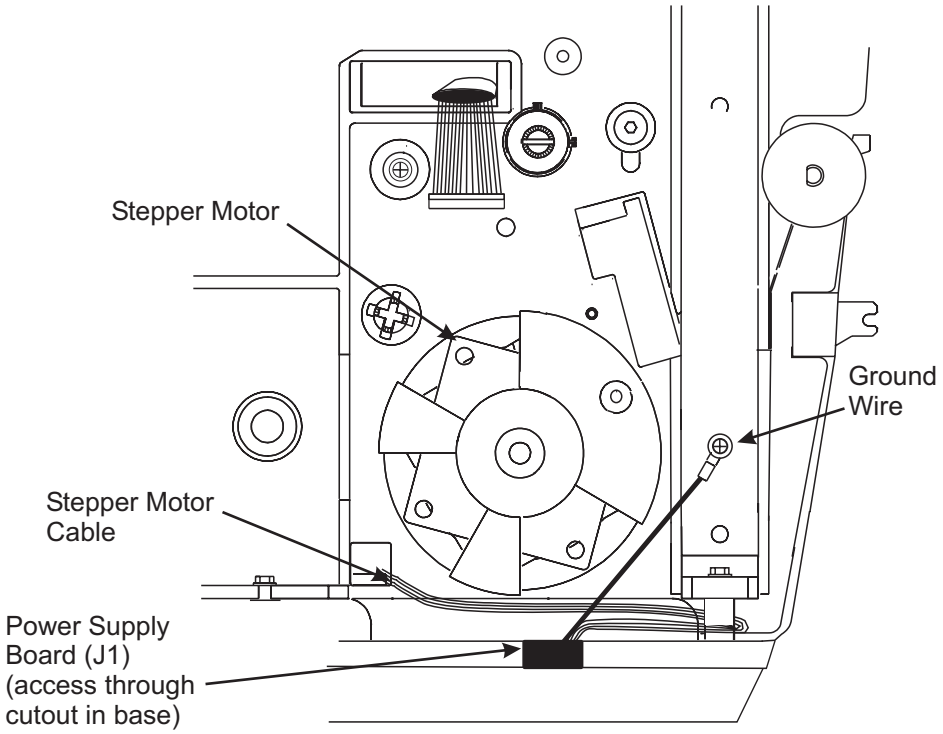

Figure 4-49. Stepper Motor (Electronics Side)

Caution:

Observe proper electrostatic safety precautions when removing, handling, and replacing printed circuit boards.

Power Supply Board Removal

1. Turn the printer Off (**O**), and remove the AC power cord and the data cable.
2. Remove media and ribbon.
3. Remove the main door and rear cover.
4. Remove the main logic board.
5. Refer to Figure 4-49. Disconnect the stepper motor cable from the power supply board (J1).
6. Disconnect the ground wire leading from the power supply board to the ground bar.
7. Refer to Figure 4-50 on page 4-59. Remove the screw in the middle of the media compartment that secures the main base to the power supply base together.
8. Insert a flat-blade screwdriver tip into the slots shown in Figure 4-50 on page 4-59.
9. Gently pull the screwdriver handle toward the front of the printer until the tabs pop out of the cutout (tabs slide into the base).
10. Carefully pry the front of the power supply base downward to remove the assembly.
11. Refer to Figure 4-51 on page 4-60. Remove the two mounting screws that secure the power supply board to the base.
12. Pivot the board off the front snaps.

Power Supply Board Installation

1. Refer to Figure 4-51 on page 4-60. Press the power supply board onto the three mounting snaps.
2. Reinstall the two mounting screws.
3. With the printer tilted up on the front cover, position the front hooks of the power supply base into the holes.
4. Route the ground wire through the opening in the base.
5. Engage the rear snaps by pivoting the power supply base assembly to the printer base.
6. Insert the screw in the middle of the media compartment that secures the main base to power supply base together.
7. Refer to Figure 4-49 on page 4-57. Connect the ground wire to the riot (ground) bar.
8. Replace the main logic board.
9. Reconnect all ribbon cable and wire harness connectors to the main logic board.
10. Reconnect the AC power cord and perform the voltage adjustment described in "Printhead Voltage Adjustment" on page 4-29.
11. Replace the rear cover and main door.
12. Reload media and ribbon.
13. Reconnect the data cable. Turn the printer On (**I**), and test for proper operation.

1. Remove the screw in the middle of the media compartment that secures the main base and power supply base.
2. Remove the ground wire from the ground bar.
3. Insert flat-blade screwdriver tip into slot.
4. Gently pull the screwdriver handle toward the front of the printer until tab pops out of cutout (into the base).
5. Carefully pry the front of the power supply base downward to remove power supply.

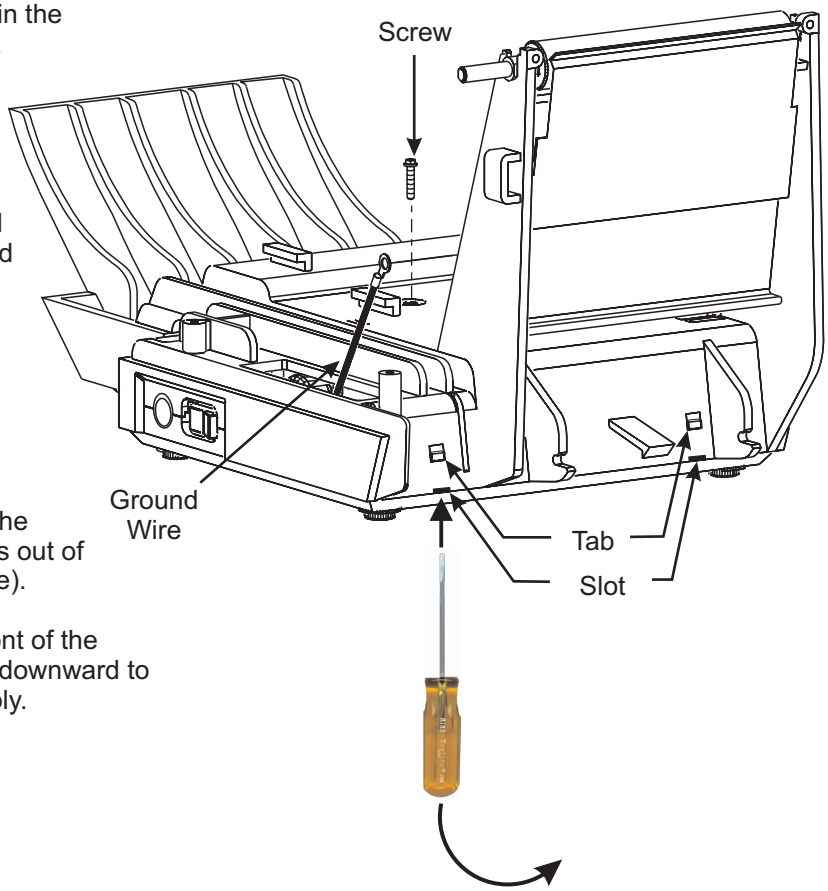

Figure 4-50. Power Supply Assembly Removal

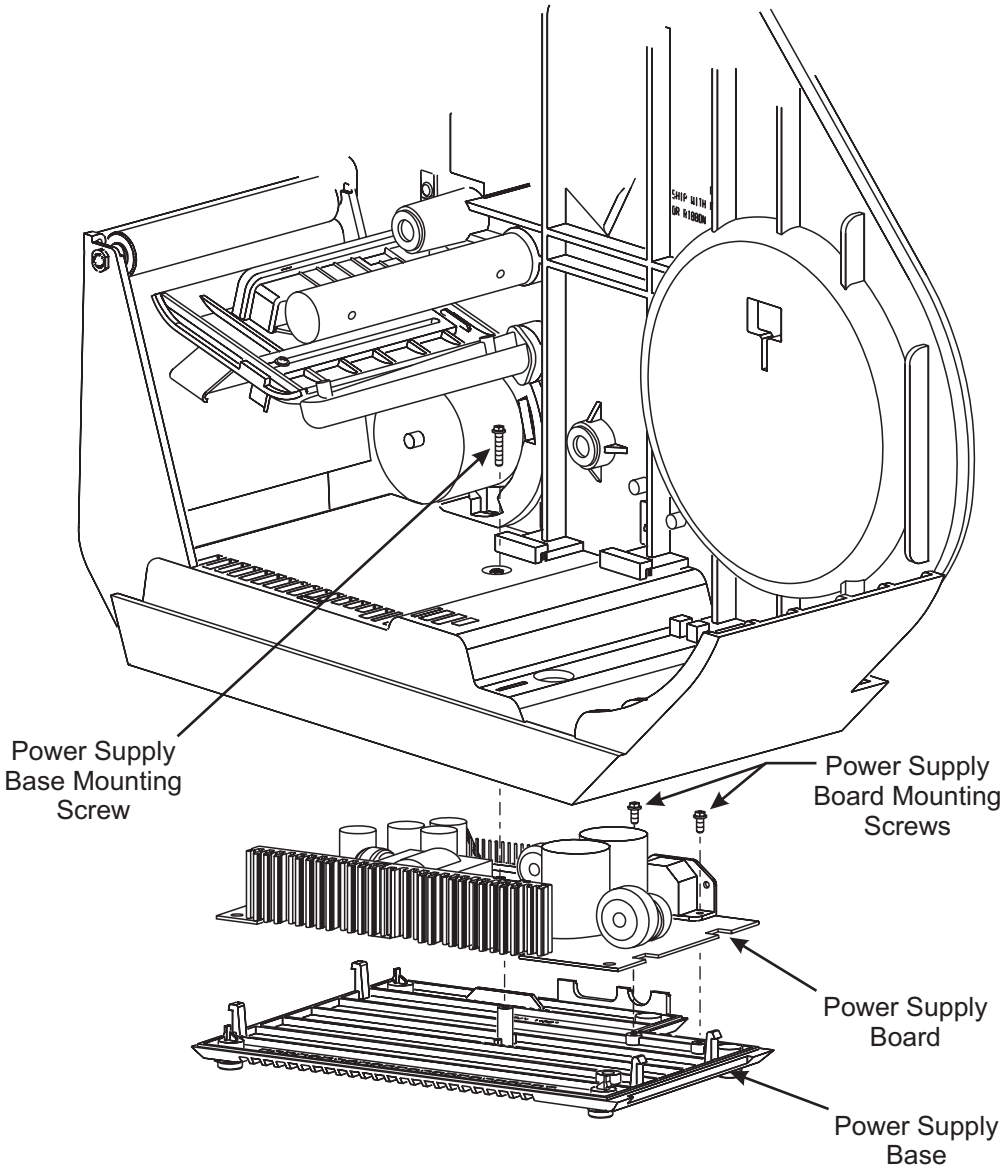

Figure 4-51. Power Supply Assembly Exploded View

AC Power Fuse Replacement

Caution:

The replacement fuse must have the ratings specified below. Serious damage may occur if a higher-rated fuse is installed.

Refer to Figure 4-52. A user-replaceable AC power fuse is located just to the left of the power switch. For 120 VAC operation, a F5A/250V fuse is used. For 220 VAC operation, a F3A/250V is used.

Note • Do not rely on a visual inspection to determine whether a fuse is blown. Always turn the printer off and remove the power cord. Then remove the fuse from the fuse holder (or circuit board) and test with an ohmmeter. A good fuse gives a short (0 ohm) indication.

1. Turn the printer Off (**O**), and remove the AC power cord.
2. Insert the tip of a flat-blade screwdriver into the slot found on the fuse holder cap. Press in on the cap and turn counterclockwise. Remove the screwdriver.
3. Grasp the fuse holder cap with your fingers and remove from the fuse holder.
4. Remove the blown fuse from the fuse holder cap and insert the proper fuse.
5. Replace the fuse holder cap by placing it into the fuse holder. Insert the tip of a flat-blade screwdriver into the slot found on the fuse holder cap. Press in on the cap and turn clockwise until the cap will no longer turn. Remove the screwdriver.

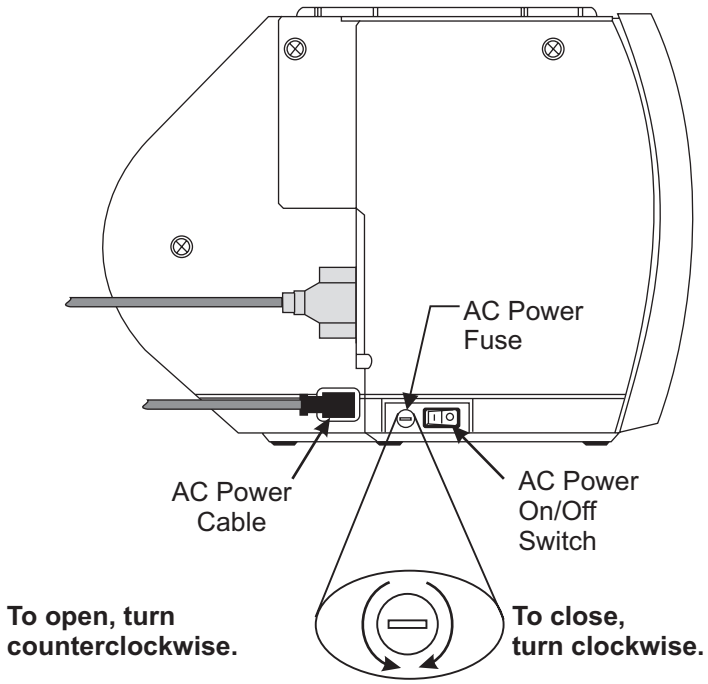

Figure 4-52. Fuse Holder Location

Options

Memory Upgrade Kit Installation Instructions

Caution:

Observe proper electrostatic safety precautions when removing, handling, and replacing printed circuit boards.

1. Turn the printer Off (**O**), and remove the AC power cord.
2. Remove the data cable.
3. Remove the rear cover.

Note • It is not necessary to remove the main door or the front door if installing only the memory upgrade kit.

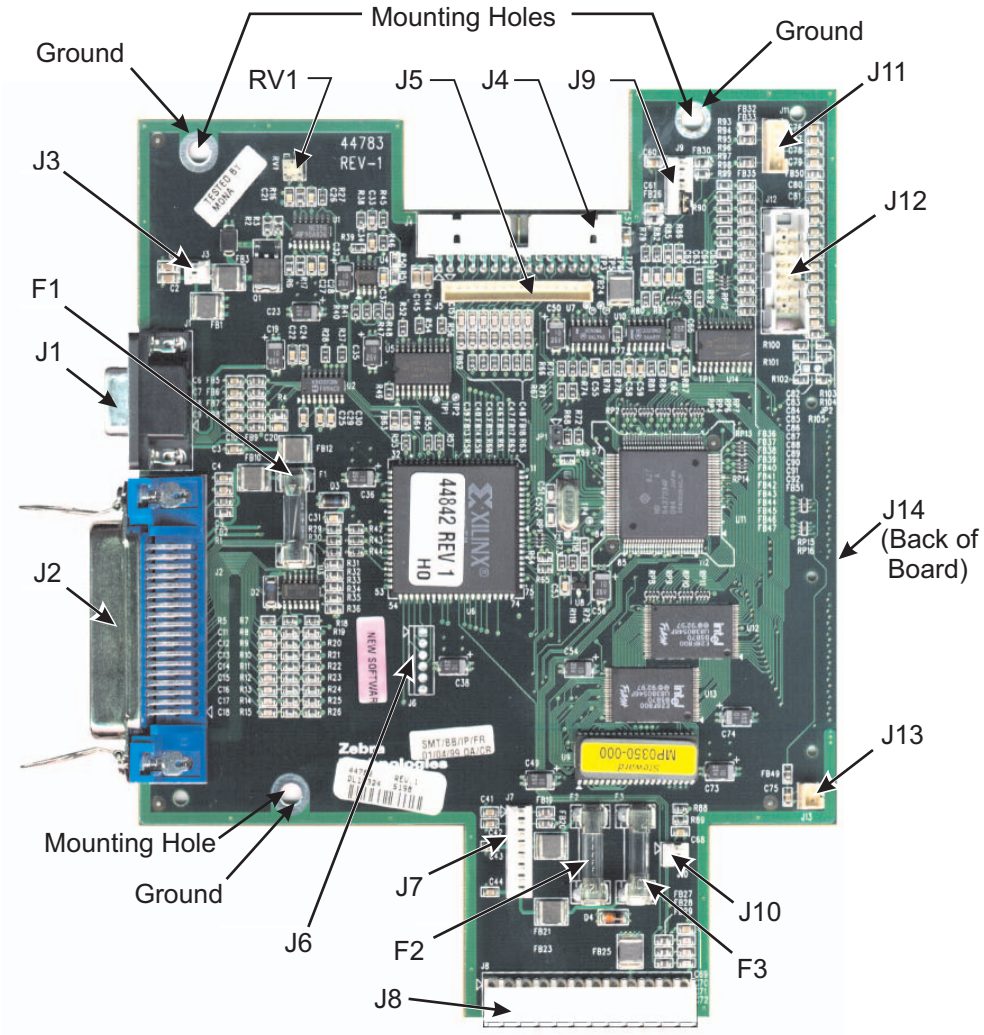

Figure 4-53. Main Logic Board Conntector and Mounting Screw Location

4. Refer to Figure 4-53. Note the positions of all ribbon cable and wire harness connectors. Remove all connectors to the main logic board.
5. Remove the three screws securing the main logic board to the main frame.
6. Carefully grasping both sides of the main logic board, pull the board straight up from the power supply connector and out of the unit. A gentle rocking motion of the main logic board may be necessary to release it from the power supply board.
7. Inspect the back of the main logic board. Remove any contaminants with a cotton swab and isopropyl alcohol (90% alcohol and 10% distilled water) on J14 (found at the left edge of the board when looking at the back of the board).
8. Lay the main logic board on the anti-static mat face up.
9. Refer to Figure 4-54 on page 4-63. Remove the three mounting screws from the memory board and put aside for use later.

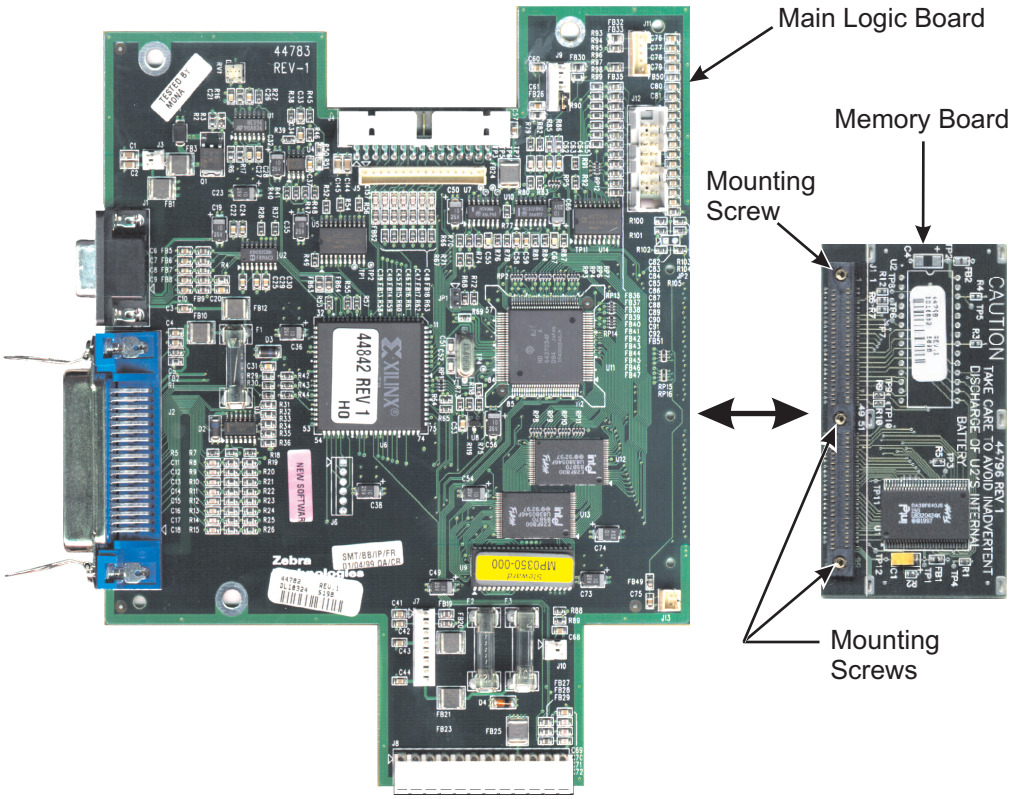

Figure 4-54. Memory Board

10. Refer to Figure 4-55. With the memory board face up (100-pin connector to the left and pins up), carefully slide the memory board underneath the main logic board.
11. Align the three screw holes in the main logic board with the three holes in the connector on the memory board.

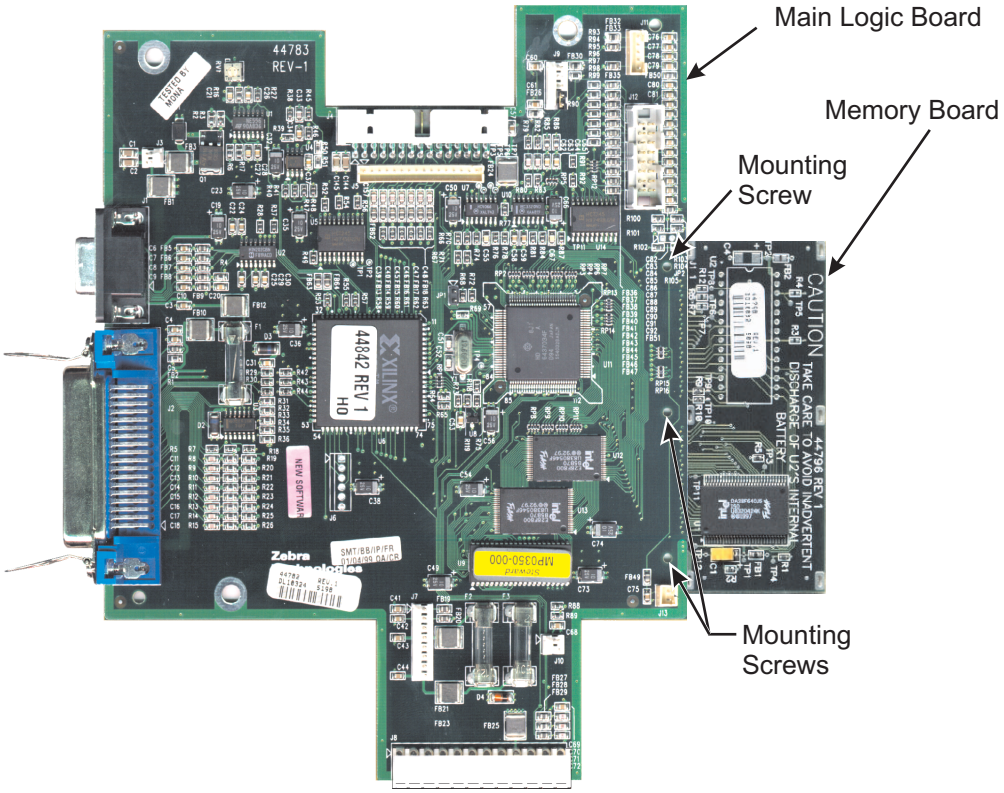

Figure 4-55. Memory Board Mounting Screws

12. Finger tighten the three screws through the main logic board and the memory board.
13. Align connector J8 at the bottom of the main logic board with the mating connector on the power supply board.

Note • Do not over-torque screws.

14. Starting with the center screw, tighten all screws.
15. Press straight down on the main logic board until connector J8 has seated completely onto the power supply board.
16. Reinstall the three screws securing the main logic board to the main frame.
17. Refer to Figure 4-53 on page 4-62. Reconnect all ribbon cable and wire harness connectors.

Important • Use full width media when performing the Cancel Key Self Test. Labels less than full width lose printing on the right side. Printing may run on to the next label when short labels.

18. Reconnect the AC power cord.
19. Reload media and ribbon.
20. Perform a Cancel Key Self Test. To start the Cancel Key Self Test, press and hold Cancel while turning the power On (**I**). The printer runs through a Power-On Self Test and then prints the configuration label.

Note • Refer to Figure 4-56 on page 4-66. This self test prints a listing of the printer's current configuration parameters that are currently stored in configuration (EEPROM) memory.

21. Inspect the label to determine if the main logic board recognizes the amount of memory that was installed. If the label indicates "NOT INITIALIZED," turn the printer off, and run the test again (this is normal for the first time power up with the optional memory).

Note • If the installed memory is still not recognized, turn the printer off, remove the power cord, and repeat steps 5 through 7. Remove the memory board and reclean the gold pads on J14 of the main logic board. Repeat steps 9 through 21.

22. Reinstall the rear cover, AC power cord, and data cable.

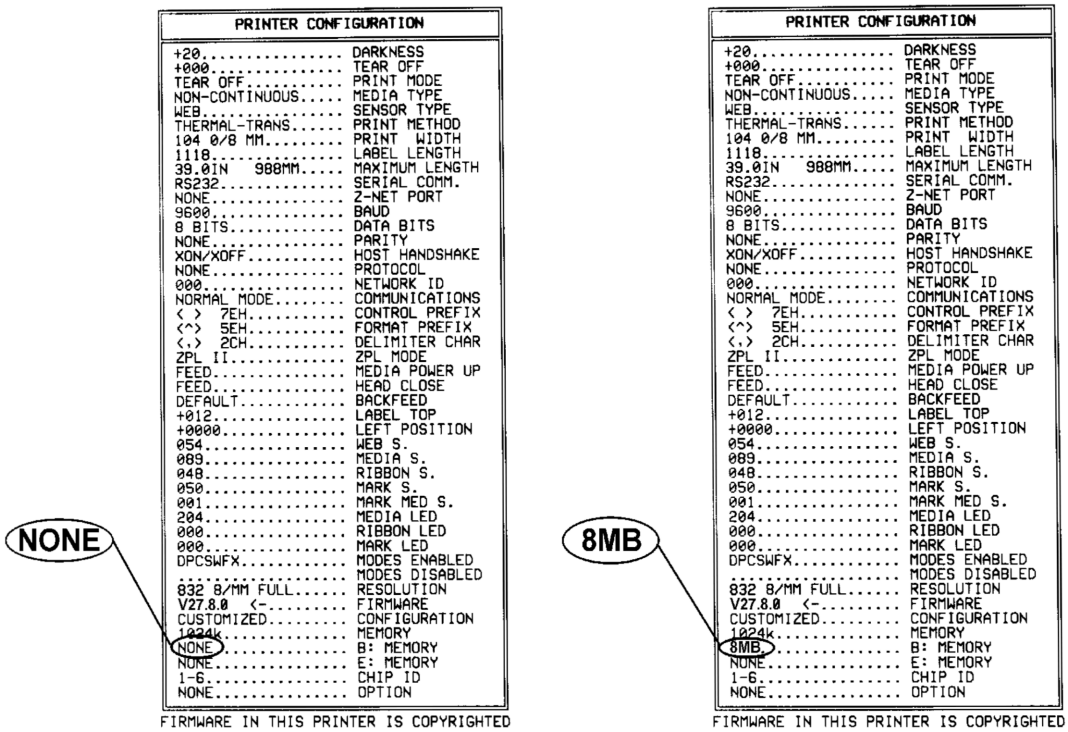

Figure 4-56. Sample Before and After Configuration Labels (8 MB Memory Board Installed)

Section 5
Maintenance and Assembly Drawings

Description

Use the mechanical assembly drawings when troubleshooting or replacing components and use the associated parts list when ordering replacement parts. Item parts that do not have associated part numbers are not available and need to be ordered using the next highest assembly number.

All parts in bold face are purchasable. All parts in light face italic are not purchasable, but may be available as part of a maintenance kit. Hardware parts in light face are not available as an individual part, but may be purchased as part of a hardware kit.

Caution:

The printer electronics is susceptible to static discharge. Before proceeding, it is recommended that the technician wear an antistatic strap connected to the printer chassis.

Table 5-1. Cover Assemblies

#	Part No.	Description	Qty
1	*44114**	Screw, M4.2 × 1.41 × 8	3
2	**44185M**	Front Door Retention Clip	1
3	**44075-1**	Rear Cover	1
4	**44076-5**	Front Door (S400)	1
	44076-4	Front Door (S600)	1
5	**44070-3**	Main Door (Standard)	1
	44070-4	Main Door (Quick Release)	1

* Available only as HW44114 in quantities of 50.

Bold=Part available for purchase
Light italic=Part not available for purchase, listed and shown for reference only

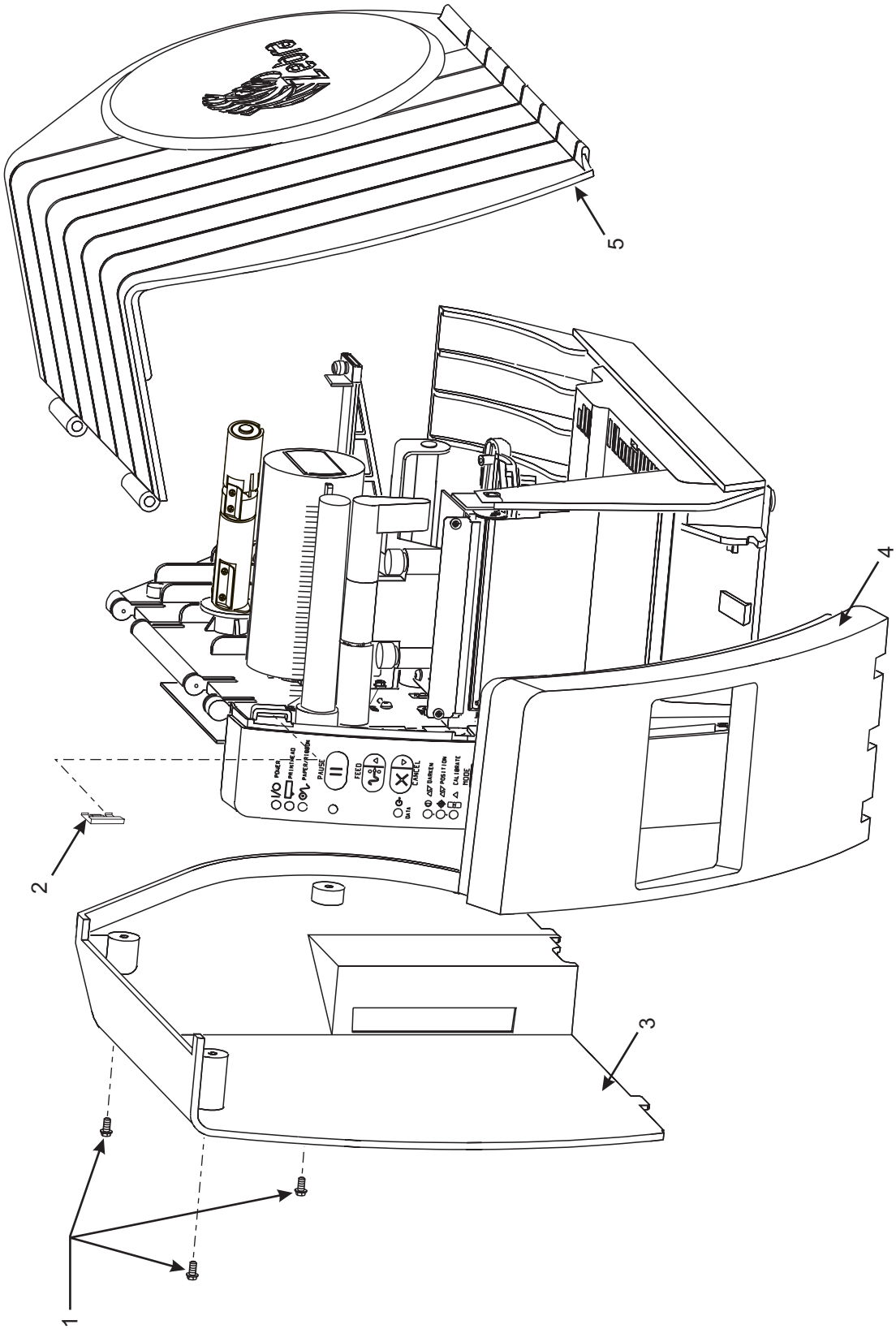

Figure 5-1. Cover Assemblies

Table 5-2. Logic Board and Control Panel

#	Part No.	Description	Qty
1	*44114**	Screw, M4.2 × 1.41 × 8	3
2	**44506M**	**(A)** LED/Button Array Maintenance Kit	1
3	**44071-400M**	**(B)** Front Panel Cover Assembly (includes one Front Door Retention Clip, two M4.2 × 1.41 × 8 screws, and one M4 × 10 screw)	1
4	**45925M**	Head-Open Sensor Flag	1
5	*45195*	Set Screw, 10–32 × 0.25	1
6	**44123**	Braided Ground Strap	1
7	**44053**	Screw, M3 × 0.6 × 10	2
8	**44784M**	**(C)** Main Logic Board (S400)	1
	44782M	**(C)** Main Logic Board (S600)	1
9	*22416*	Hex Stand-Off, 4–40	2
10	*01155***	Lock Washer, #4	2
11	**44077**	Ground Bezel	1
12	*44115****	Screw, M4 × 10	1

***** Available only as HW44114 in quantities of 50.

****** Available only as HW01155 in quantities of 100.

******* Available only as HW44115 in quantities of 10.

Bold=Part available for purchase
Light italic=Part not available for purchase, listed and shown for reference only

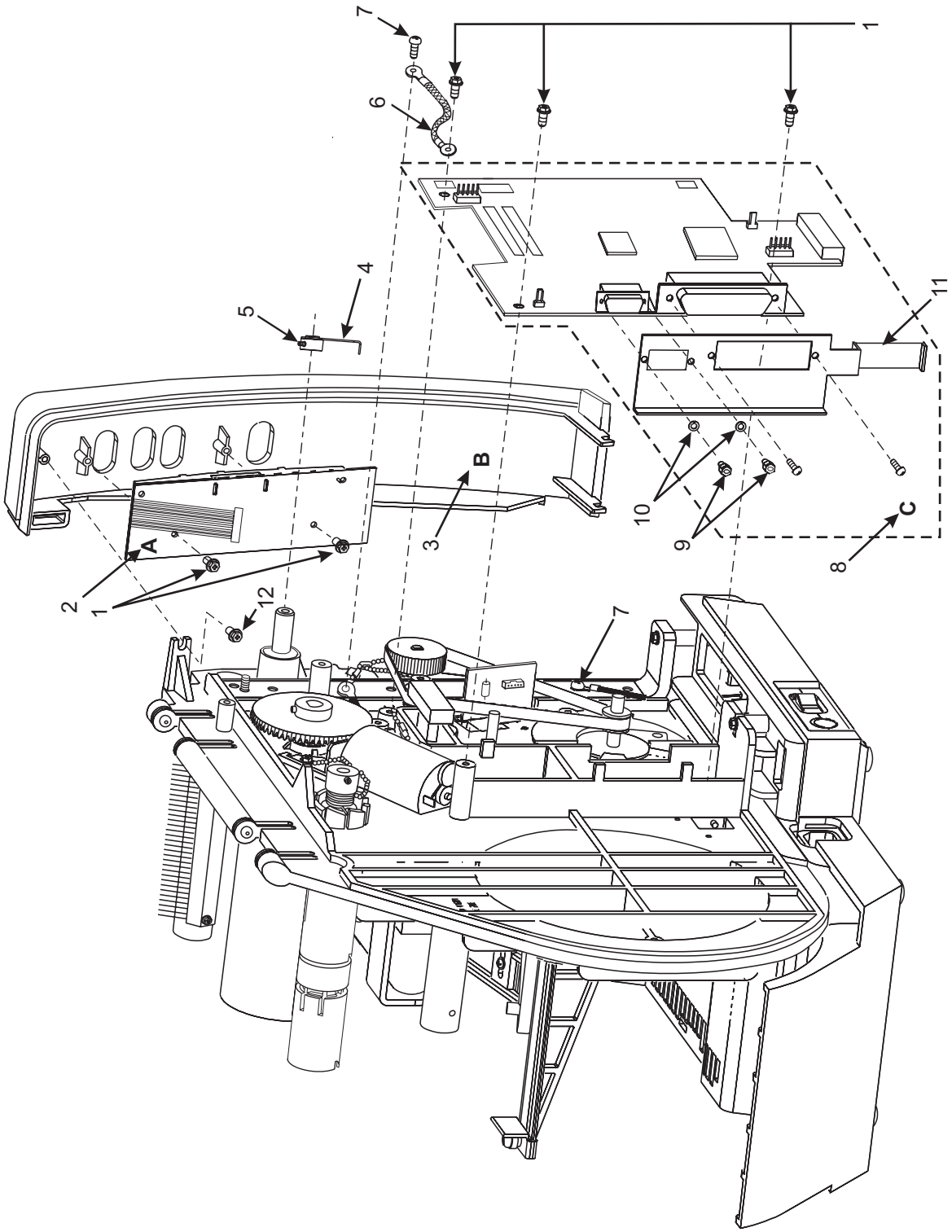

Figure 5-2. Logic Board and Control Panel

Table 5-3. Media Supply, Ribbon Supply, and Ribbon Take-Up

#	Part No.	Description	Qty
1	**44052-400M**	Ribbon Take-Up Spindle Assembly (Tear-Off and Cutter Option)	1
	44052-402M	Ribbon Take-Up Spindle Assembly (Peel-Off Option)	1
2	*30251**	Washer, 0.836 × 0.390 × 0.048	1
3	**44912-400M**	**(C)** Dual Torque Ribbon Supply Spindle Kit	1
4	**44069**	Media Bracket	1
5	**44066-1M**	**(B)** Media Edge Guide & Thumb Screw	1
6	**44068-1**	Media Edge Guide	1
7	**44067**	Nylon Thumb Screw, M3.5 × 6 × 5	1
8	*44176***	Wire Clip	1
9	**44466**	Ground Cable	1
10	*44053****	Screw, M3 × 0.6 × 10	1
11	**44118**	Shaft Collar, 0.377 × 0.750	1
12	*44100*†	Set Screw, M3 × 0.5 × 6	4
13	*44084*††	Washer, 0.70 × 0.38 × 0.03	4
14	**44046-2**	Bevel Gear, 60T	1

Table 5-3. Media Supply, Ribbon Supply, and Ribbon Take-Up

#	Part No.	Description	Qty
15	*44339*†††	Hex Stand-Off	1
16	*44356*‡	Washer, 0.198 × 0.75 × 0.085	1
17	**44043M**	**(A)** RTU Motor Assembly	1
18	*44278*‡‡	Chain Assembly 1-¾"	1
19	**44198M**	Ribbon Take-Up Motor Cable	1
20	**44481**	Ground Chain Assembly 1-3/8"	1
21	*44114*‡‡‡	Screw, M4.2 × 1.41 × 8	2
22	*10432*¶	Screw, M4 × 0.7	1

* Available only as HW30251 in quantities of 25.
** Available only as HW44176 in quantities of 25.
*** Available only as HW44053 in quantities of 10.
† Available only as HW44100 in quantities of 25.
†† Available only as HW44084 in quantities of 10.
††† Available only as HW44339 in quantities of 10.
‡ Available only as HW44356 in quantities of 25.
‡‡ Available only as HW44278 in quantities of 25.
‡‡‡ Available only as HW44114 in quantities of 50.
¶ Available only as HW10432 in quantities of 25.

Bold=Part available for purchase
Light italic=Part not available for purchase, listed and shown for reference only

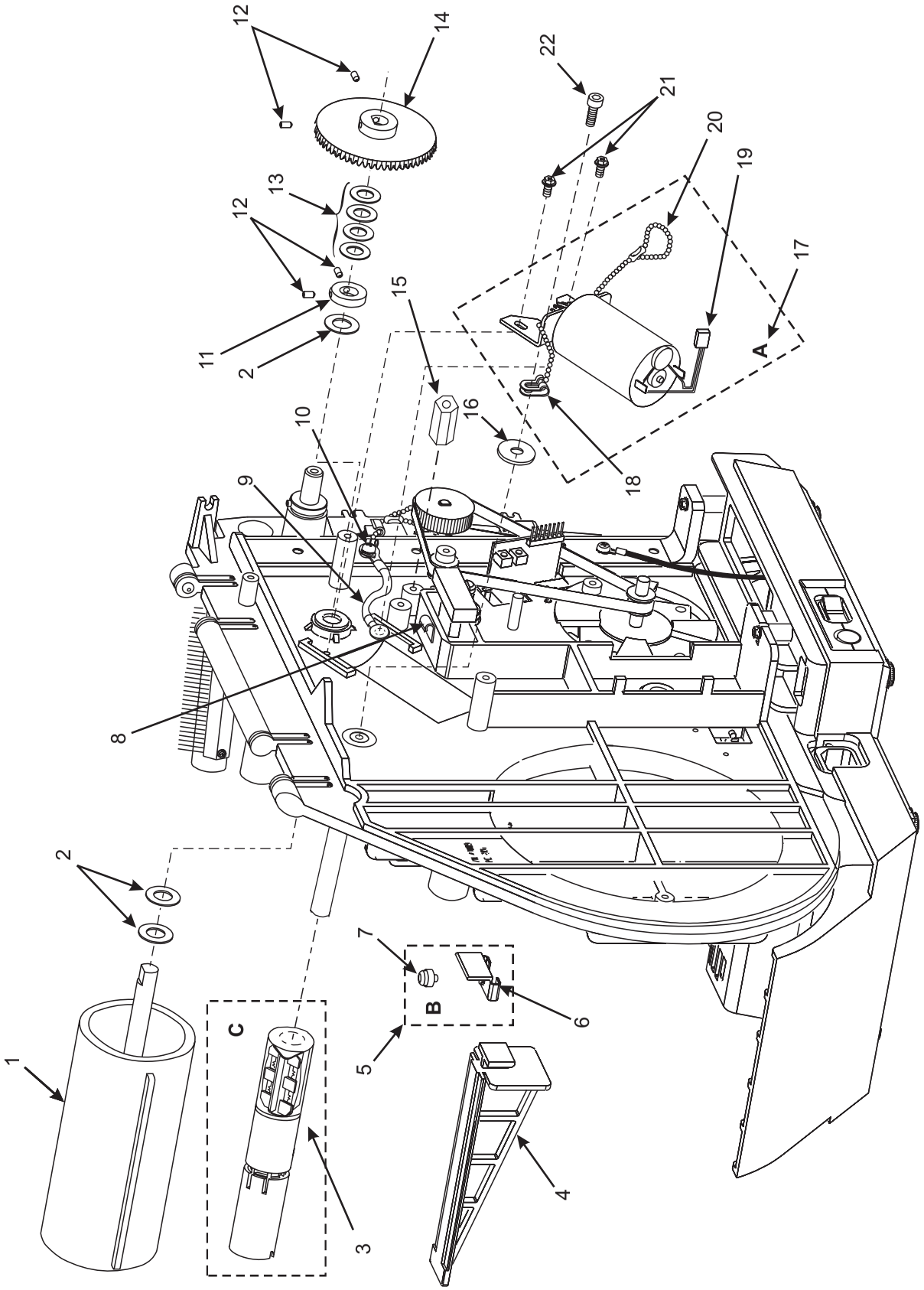

Figure 5-3. Media Supply, Ribbon Supply, and Ribbon Take-Up

Table 5-4. Toggle and Print Mechanism

#	Part No.	Description	Qty
1	**44329-400M**	**(A)** Toggle Assembly	1
2	**44360**	Spring Washer	1
3	*77687*	Braided Ground Strap	1
4	**44054**	Screw, M3.5 × 20	1
5	*01448******	Screw, 6–32 × 0.37	2
6	*44484*******	Screw, M4.2 × 1.41 × 25	1
7	*44923********	Braided Ground Strap	1
8	**45925M**	Head Open Sensor Flag	1
9	*44860*†	Screw, 10-32 × 1.5 SHCS	1
10	*44339*††	Hex Stand-Off	1
11	**44180M**	**(B)** Print Mechanism Assembly (*S*400)	1
	44204M	**(B)** Print Mechanism Assembly (*S*600)	1
12	*30466*†††	Washer, 0.26 × 0.63 × 0.06	1
13	*07257*‡	Washer, 0.438 × 0.188 × 0.049	1
14	*44386*‡‡	Screw, M4 × 0.7 × 16	1
15	*06262*‡‡‡	Nut, 6–32	2

***** Available only as HW01448 in quantities of 25.
** Available only as HW44484 in quantities of 10.
*** Available only as HW44923 in quantities of 5.
† Available only as HW44860 in quantities of 25.
†† Available only as HW44339 in quantities of 10.
††† Available only as HW30466 in quantities of 25.
‡ Available only as HW44860 in quantities of 25.
‡‡ Available only as HW44386 in quantities of 25.
‡‡‡ Available only as HW06262 in quantities of 25.

Bold=Part available for purchase
Light italic=Part not available for purchase, listed and shown for reference only

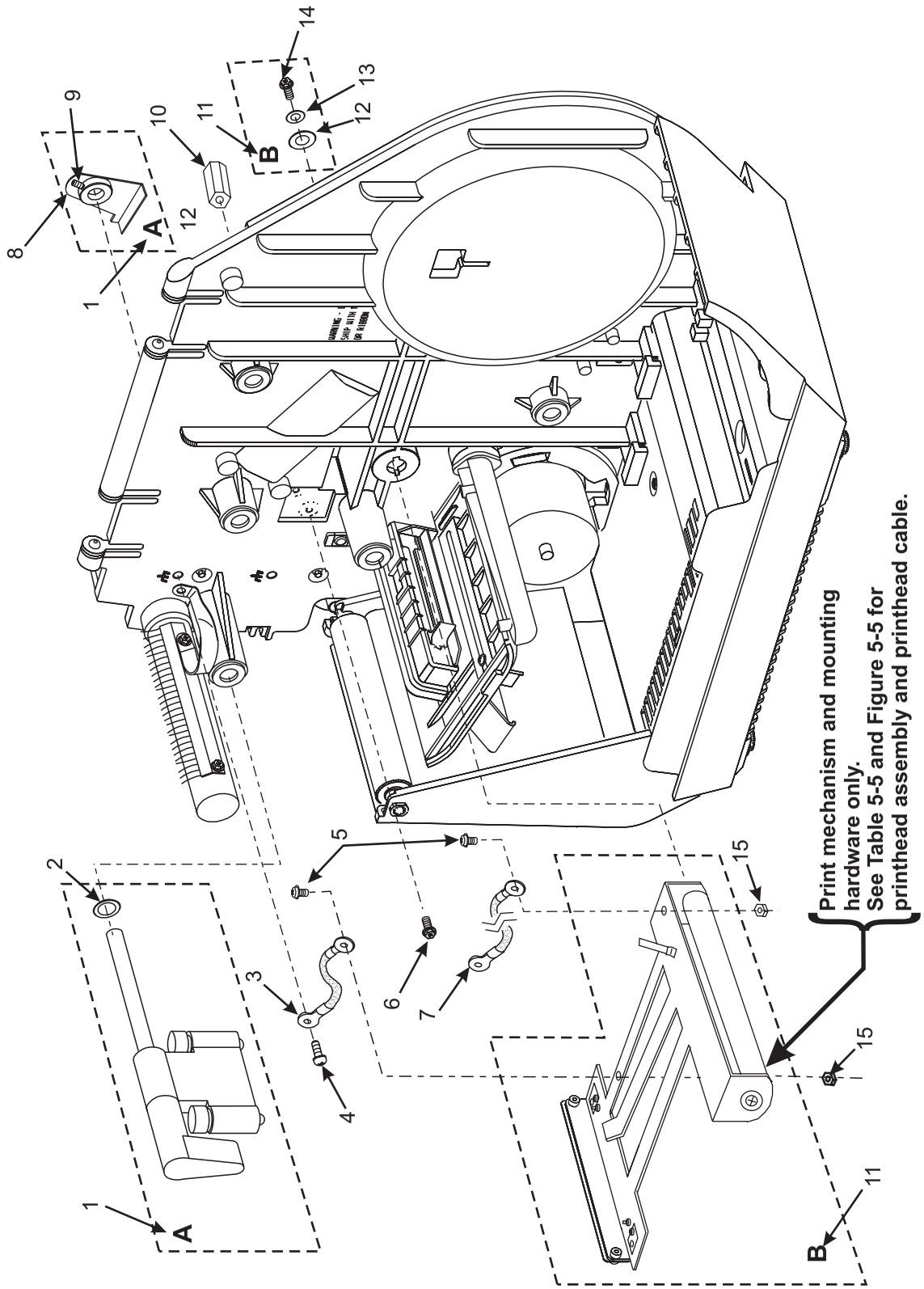

Figure 5-4. Toggle and Print Mechanism

Table 5-5. Print Mechanism and Printhead Assembly

#	Part No.	Description	Qty
1	**44999M**	**(A)** Printhead Assembly (*S*400)	1
	44998M	**(A)** Printhead Assembly (*S*600)	1
2	*10460**	Nut, M3 × 2.4 × 5.5	2
3	**44180M**	**(B)** Print Mechanism Assembly (*S*400)	1
	44204M	**(B)** Print Mechanism Assembly (*S*600)	1
4	**44527**	Printhead Cable Assembly (*S*400)	1
	44920	Printhead Cable Assembly (*S*600)	1
5	*44386***	Screw, M4 × 0.7 × 16	1
6	*07257****	Flat Washer, 0.438 × 0.188 × 0.049	1
7	*30466*†	Washer, 0.26 × 0.63 × 0.06	1

* Available only as HW10460 in quantities of 25.
** Available only as HW44386 in quantities of 25.
*** Available only as HW07257 in quantities of 25.
† Available only as HW30466 in quantities of 25.

Bold=Part available for purchase
Light italic=Part not available for purchase, listed and shown for reference only

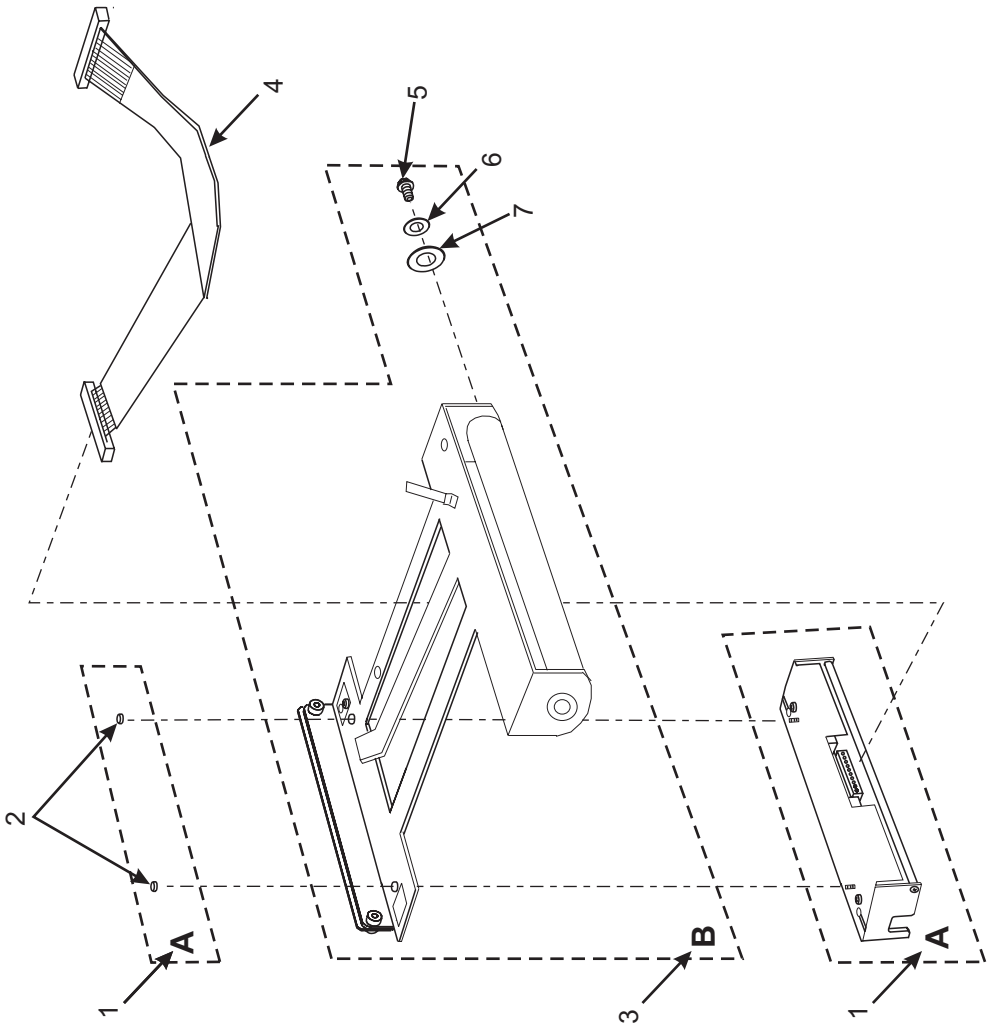

Figure 5-5. Print Mechanism and Printhead Assembly

Table 5-6. Tear/ Cutter Media Sensor and Ribbon Guide

#	Part No.	Description	Qty
1	*44054**	Screw, M3 × 20	1
2	**44123**	Braided Ground Strap	1
3	**44190-400M**	**(B)** Ribbon Guide Assembly	1
4	**44189**	Anti-Static Brush	1
5	*44114***	Screw, M4.2 × 1.41 × 8	5
6	**44466**	Ground Cable	1
7	*30466****	Washer, 0.26 × 0.63 × 0.06	1
8	*07257*†	Washer, 0.438 × 0.188 × 0.036	1
9	*30393-008*††	Screw, 8-32 × 0.500	1
10	**44968**	Ribbon Out Reflective Bracket	1
11	**44135-400M**	**(A)** Media Sensor Assembly (Standard)	1
	44911M	**(A)** Media Sensor Assembly (Black Mark)	1
12	**44747**	Media/Ribbon Sensor Cable	1
13	**44011**	Media Guide	1

Table 5-6. Tear/ Cutter Media Sensor and Ribbon Guide

#	Part No.	Description	Qty
14	**44140-400M**	**(C)** Upper Media Guide Plate Assembly (Tear-Off and Cutter Option only)	1
	44140-402M	**(C)** Upper Media Guide Plate Assembly (Peel-Off Option only)	1
15	**44109**	Stationary Guide	1
16	*44110-1*	Adjustable Guide	1
17	*30208*‡	Flat Washer, 0.50 × 0191 × 0.03	1
18	*40194*‡‡	Curved Washer, 0.344 × 0.172 × 0.006	1
19	**44016**	Upper Media Guide	1
20	**Q10034**	Washer, 0.381 × 0.126 × 0.042	1
21	**10403**	Screw, M3 × 0.5 × 6	1

***** Available only as HW44054 in quantities of 10.
****** Available only as HW44114 in quantities of 50.
******* Available only as HW30466 in quantities of 25.
† Available only as HW07257 in quantities of 25.
†† Available only as HW30393-008 in quantities of 25.
††† Available only as HW44484 in quantities of 10.
‡ Available only as HW30208 in quantities of 25.
‡‡ Available only as HW40194 in quantities of 25.

Bold=Part available for purchase
Light italic=Part not available for purchase, listed and shown for reference only

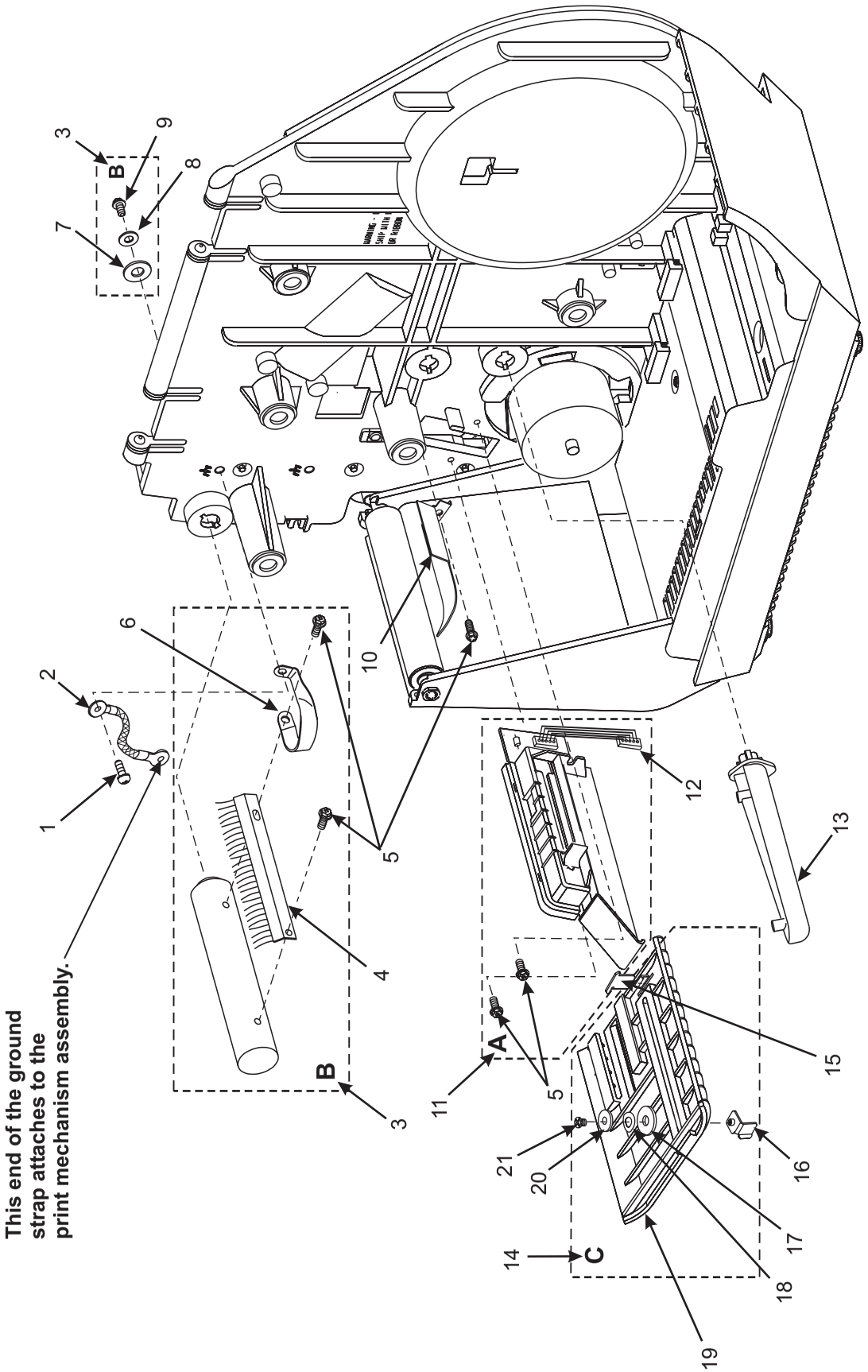

Figure 5-6. Tear/Cutter Media Sensor, Ribbon Guides, and Media Guide

Table 5-7. Peel-Off Option (Front View)

#	Part No.	Description	Qty
1	**44463M**	**(A)** Platen Guide Rod Kit	1
2	*30224**	Crescent Ring	2
3	*44147***	Set Screw	2
4	**44118**	Shaft Collar, 0.377 × 0.750	1
5	**44349M**	**(B)** Upper Media Rod Kit	1
6	**44398M**	**(C)** Lower Guide Rod Kit	1
7	**44346**	Edge Guide	2
8	**10473**	Washer, M4	1
9	*44114****	Screw, M4.2 × 1.41 × 8	3
10	**44391**	Anti-Static Brush	1
11	**44218**	Backing Rewind Hook	1
12	**44284M**	**(D)** Media Take-Up Spindle Assembly	1
13	**44390**	Washer, 0.500 × 0.377 × 0.020	3
14	*07257*†	Flat Washer, 0.438 × 1.41 × 25	1
15	**44383**	Ground Cable Assembly	1
16	*44386*††	Screw, M4 × 0.7 × 16	1
17	**44191**	Ground Chain Assembly	1

*** Available only as HW30224 in quantities of 50.**
**** Available only as HW44147 in quantities of 25.**
***** Available only as HW44114 in quantities of 50.**
† Available only as HW07257 in quantities of 25.
†† Available only as HW44386 in quantities of 25.

Bold=Part available for purchase
Light italic=Part not available for purchase, listed and shown for reference only

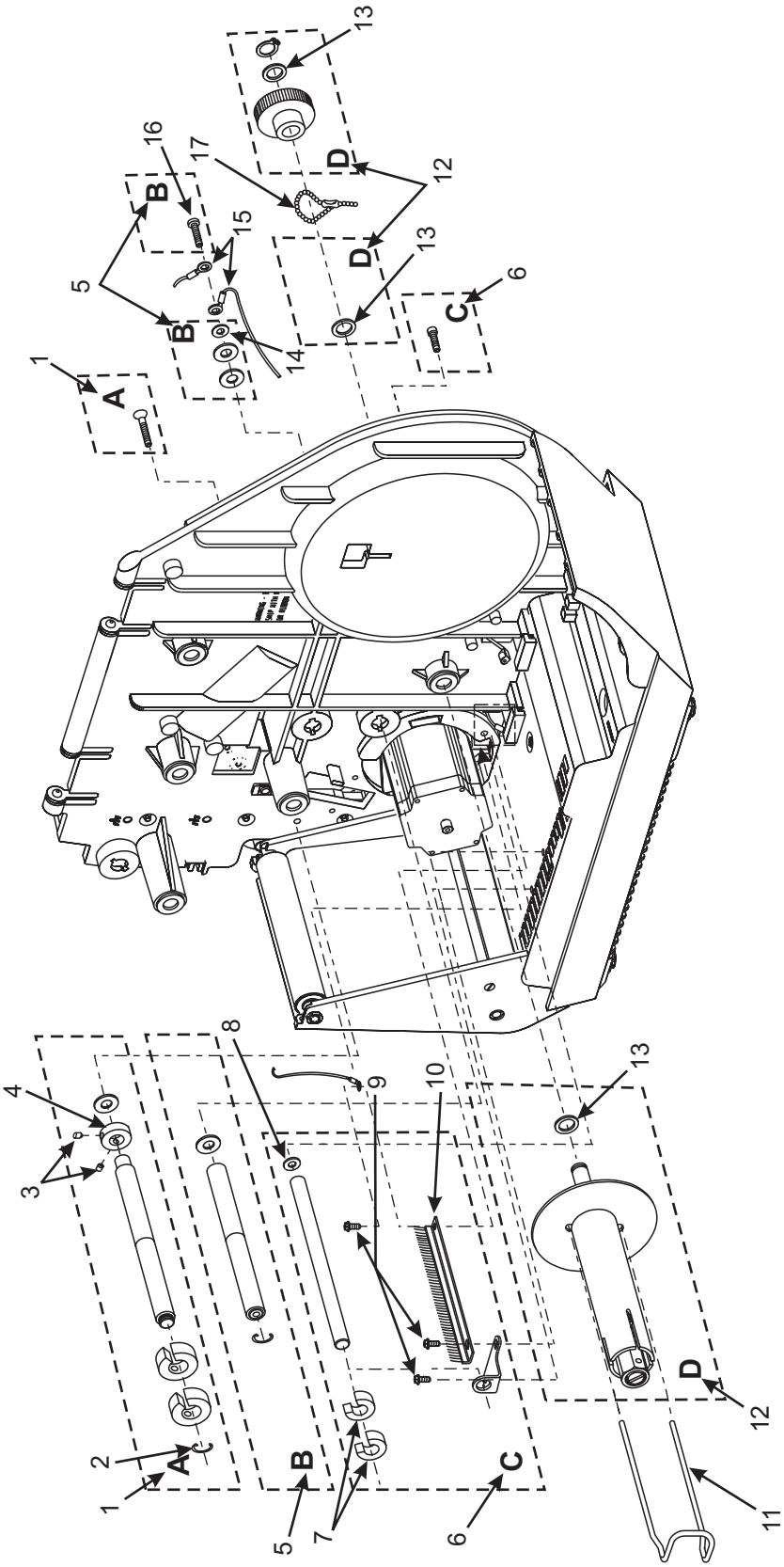

Figure 5-7. Peel-Off Option (Front View)

Table 5-8. Tear/Cutter Drive System

#	Part No.	Description	Qty
1	**44023-0M**	Stepper Motor (Tear-Off and Cutter Option)	1
	44023-2M	Stepper Motor (Peel-Off Option)	1
2	*44216**	Screw, M4.2 × 1.41 × 13	1
3	**44177**	Tear-Plate Ground Strap	1
4	**44019**	Idler Shaft	1
5	**44025**	Idler Pulley, 20T (Tear-Off and Cutter Option only)	1
6	*44356***	Washer 0.198 × 0.75 × 0.085 (Tear-Off and Cutter Option)	1
7	**44055**	Nut, M5 × 0.8 × 2.6	1
8	*44172-2****	Ground Chain Assembly 1-1/8"	1
9	**45189-5**	Main Drive Belt (S400/600 Peel-Off Option)	1
	45189-6	Main Drive Belt (S600 Tear-Off and Cutter Option)	1
	45189-8	Main Drive Belt 160T (S400 Tear-Off and Cutter Option)	1
10	**44017**	Platen Pulley (S400)	1
	44022	Platen Pulley, 50T (S600)	1
11	*44485*	Screw, M3 × 8	1
12	*44100†*	Set Screw, M3 × 0.5 × 6	1

***** Available only as HW44216 in quantities of 25.
****** Available only as HW44356 in quantities of 25.
*** Available only as HW44172-2 in quantities of 10.
† Available only as HW44100 in quantities of 25.

Bold=Part available for purchase
Light italic=Part not available for purchase, listed and shown for reference only

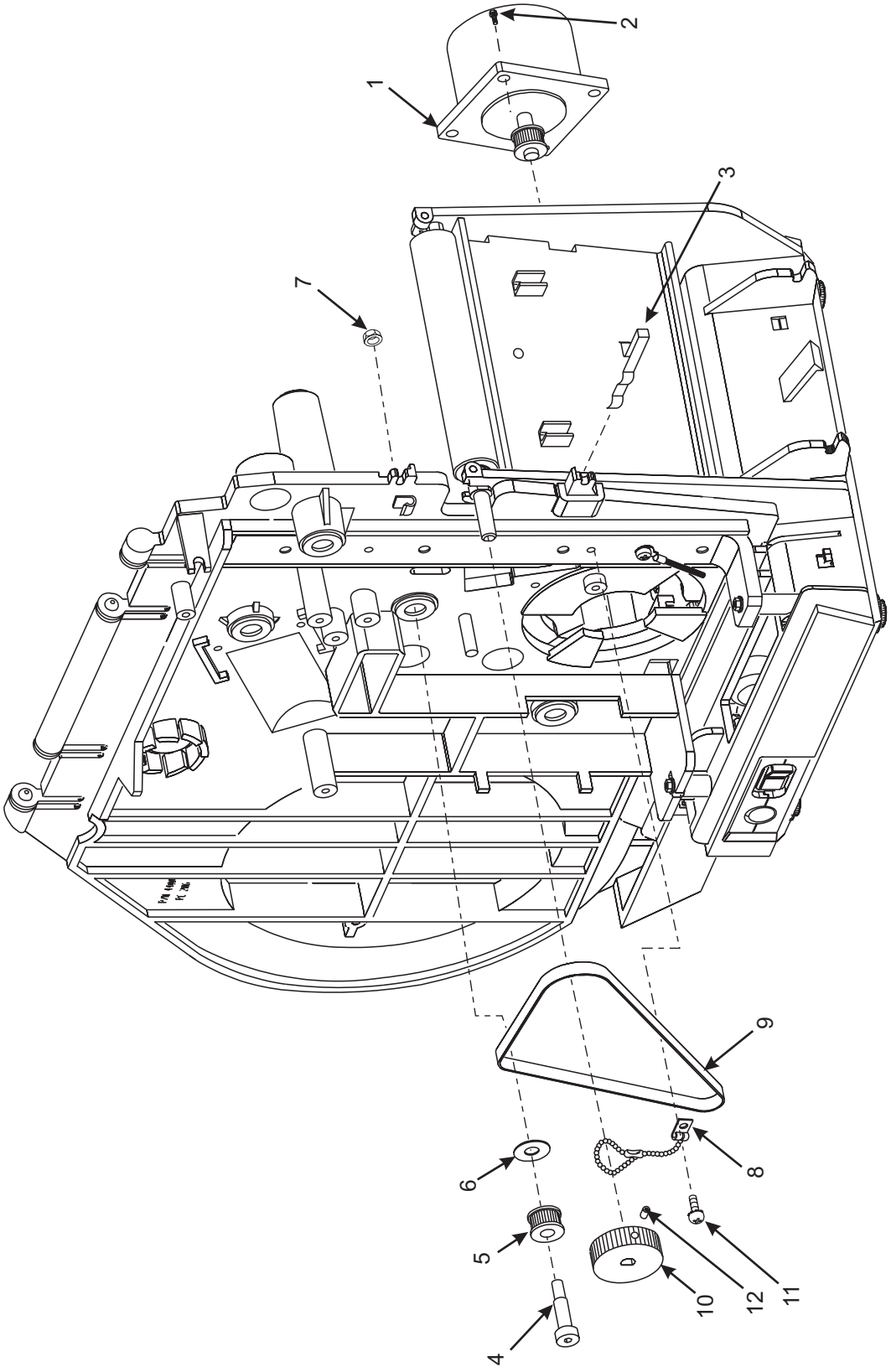

Figure 5-8. Tear/Cutter Drive System

Table 5-9. Peel-Off Option Drive System

#	Part No.	Description	Qty
1	**44359M**	**(B)** Peel-Off Upper Idler Assembly	1
2	**44363**	Screw, M5 × 0.8 × 25	1
3	*30261**	Flat Washer, 0.442 × 0.255 × 0.020	1
4	*44496*	Peel Pulley Assembly	1
5	*44359*	Idler Spacer	1
6	**30163**	Flat Washer, 0.720 × 0.262 × 0.047	1
7	**44142**	Square Nut	1
8	**45189-7**	Belt 118T	1
9	**44358M**	**(C)** Media Take-Up Idler Assembly	1
10	**44489**	Shoulder Screw, M5 × 0.8 × 8	2
11	**44487**	Idler pulley, 0.750	2
12	**10476**	Flat Washer, M5	2
13	*44114***	Screw, M4.2 × 1.41 × 8	7
14	*44488*	Idler Bracket	1
15	**44536M**	**(A)** Take-Label Sensor Assembly	1
16	*44216****	Screw, M4.2 × 1.41 × 13	3
17	**44665M**	Full Roll Switch Assembly	1
18	**44275M**	**(E)** Power Roller Assembly	1
19	**45189-5**	Peel-Off Main Drive Belt	1
20	**44368**	**(D)** Carrier Idler Assembly	1

Table 5-9. Peel-Off Option Drive System

#	Part No.	Description	Qty
21	**44376**	Washer, 0.420 × 0.254 × 0.010	3
22	**44274**	Bearing Plate	1
23	**30104**	Ball Bearing, 0.50 × 0.250 × 0.125	2
24	**02252**	External Crescent Ring 0.250	2
25	**44172-1**	Ground Chain Assembly 1-3/4"	1
26	**44275**	Power Roller	1
27	**10461**	Nut, M4 × 0.7	2
28	**44293**	Eccentric Spring	1
29	**44292**	Eccentric Power Roller	1
30	**44383**	Ground Cable Assembly	
31	**44191**	Ground Chain Assembly	1
32	*44176*†	Wire Clip	3
33	**44387**	Screw, M3.5 × 0.6 × 6	3
34	**10427**	Screw, M4 × 0.70 × 10	2
35	**44282**	Tear-Off Plate	1
36	**44023-2M**	Stepper Motor (Peel-Off Option)	1

* Available only as HW30261 in quantities of 25.
** Available only as HW44114 in quantities of 50.
*** Available only as HW44216 in quantities of 25.
† Available only as HW44176 in quantities of 25.

Bold=Part available for purchase
Light italic=Part not available for purchase, listed and shown for reference only

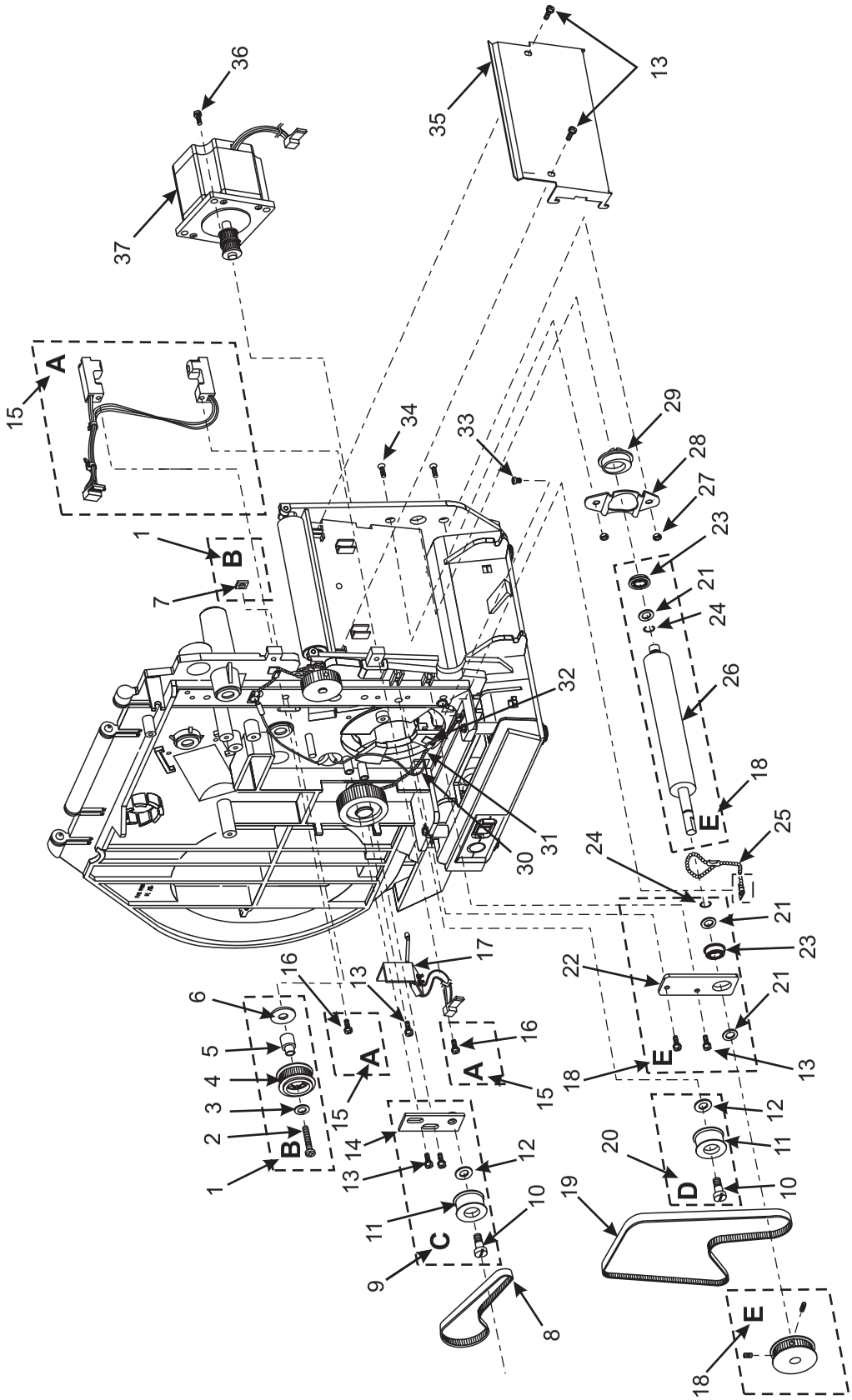

Figure 5-9. Peel Option and Peel Drive System

Table 5-10. Platen and Power Supply

#	Part No.	Description	Qty
1	*44114**	Screw, M4.2 × 1.41 × 8	4
2	**44282**	Tear-Off Plate	1
3	**44015**	Platen Sleeve Bearing	2
4	**44120**	Outboard Guide	1
5	**44182**	Platen Roller (*S*400)	1
	44214	Platen Roller (*S*600)	1
6	**44121**	Inboard Guide	1
7	*44484***	Screw, M4.2 × 1.41 × 25	1
8	*44115****	Screw, M4 × 10	2
9	**45770M**	Power Supply Assembly 120/240 VAC	1
10	**44004-400M**	Base Cover	1

***** Available only as HW44114 in quantities of 50.
** Available only as HW44484 in quantities of 10.
*** Available only as HW44115 in quantities of 10.

Bold=Part available for purchase
Light italic=Part not available for purchase, listed and shown for reference only

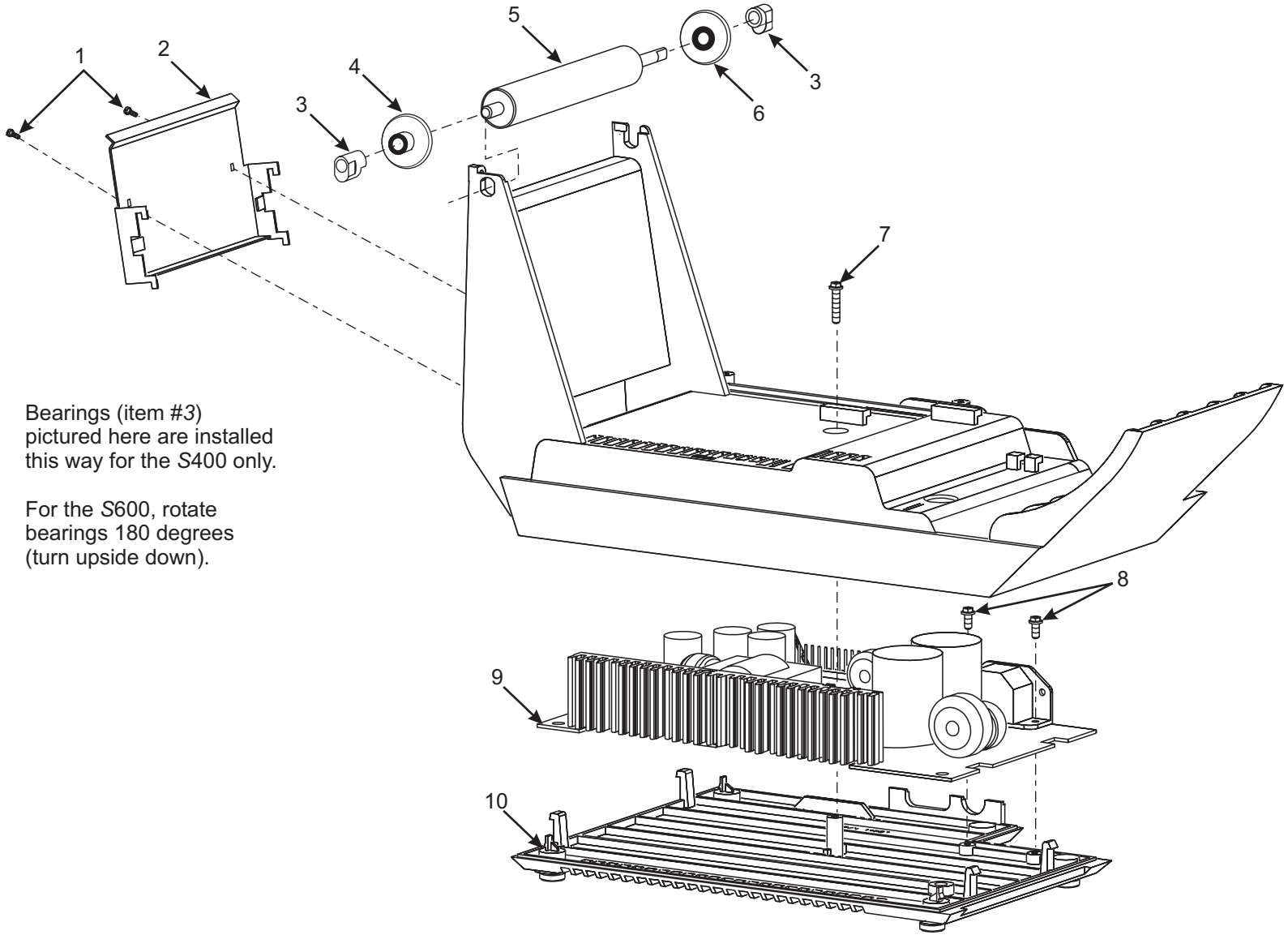

Figure 5-10. Platen and Power Supply

Table 5-11. Cutter Option

#	Part No.	Description	Qty
1	**44710M**	Cutter Maintenance Kit	1
2	**44986**	Catch Tray	1
3	**10432M**	Plate Mounting Maintenance Kit	1
4	*10432**	Screw, M4 × 0.7 × 12	3
5	*10474***	Split Washer, M4	2
6	*07257****	Washer, 0.438 × 0.188 × 0.036	3
7	**44437M**	Cutter Mounting Maintenance Kit	1
8	*44437*	Mounting Bushing	2
9	*44433*	Spring Washer	2
10	*44432*	Locating Post	2
11	**06223**	Cable Clamp 0.188	1
12	**44674**	Cable 8 Cond DIN (Cutter Cable)	1
13	**10461**	Nut M4 × 0.7	1
14	*44434*	Nut Plate	1
15	*01159*†	External Lock Washer, #6	1
16	**30781**	Ground Cable	1
17	*44053*††	Screw, M3 × 0.6 × 10	1

*** Available only as HW10432 in quantities of 25.**

*** Available only as HW10474 in quantities of 25.**

**** Available only as HW07257 in quantities of 25.**

*** Available only as HW01159 in quantities of 100.**

*** Available only as HW44053 in quantities of 10.**

Bold=Part available for purchase
Light italic=Part not available for purchase, listed and shown for reference only

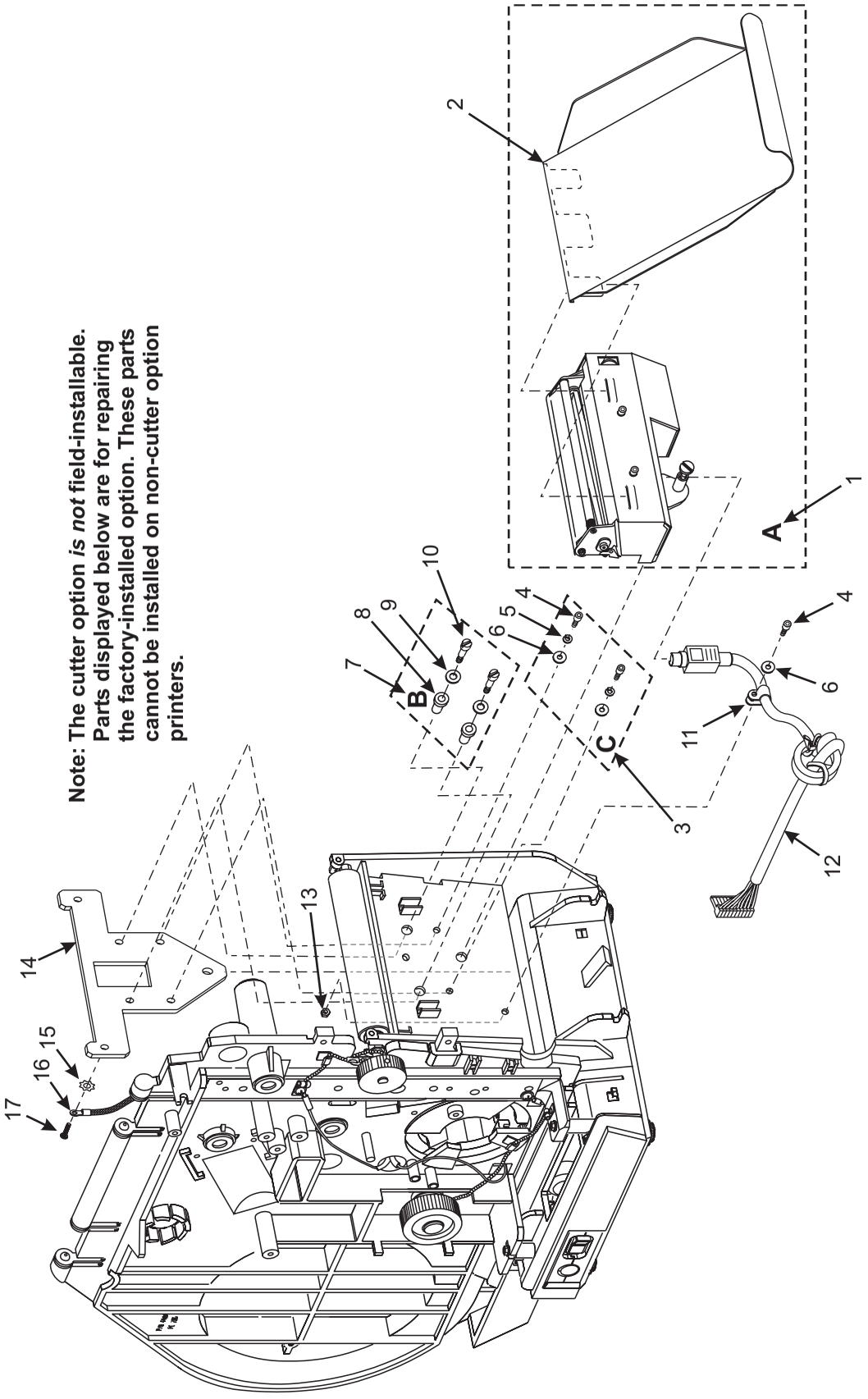

Figure 5-11. Cutter Option

Index

A

AC Power Fuse Replacement 4-61
Accessing the Printer 2-5
Additional Printer Self Tests 2-14
Auto Calibration 2-21

B

Bar Codes 1-2
Bitmapped Fonts 1-3

C

Calibration 2-21
  Auto Calibration 2-21
  Manual Calibration 2-22
  Ribbon Parameter 2-23
  Status Indicator 2-2
Calibration Reference Table 4-17
Cancel Key 2-3, 2-16
Cleaning
  Cutter Module 4-9–4-15
  Exterior 4-5
  Interior 4-5
  Media and Ribbon Path 4-5
  Printhead and Platen 4-7
  Schedule 4-6
Codes, Bar 1-2
Communication
  1-8
  Specifications 1-9
Configuration Label 2-24
Configuration Mode 2-23
Control Panel 4-36
  Circuit Board Replacement 4-37
  Removal 4-36
Cutter Mode 1-1

D

Darken Status Indicator 2-2
Data Cable Installation 2-14
Data Status Indicator 2-1
Diagnostics 4-15
  Calibration Reference Table 4-17
  Extended Diagnostics 4-22
  Feed Key Rollback Test 4-23
  Head Temp Test Label 4-20, 4-21
  Left Wrinkle Label 4-19
  Lower Smear Test Label 4-22
  Pause & Cancel Key Label 4-18
  Pause and Cancel Key Self Test 4-16
  Pause Key Loopback Test 4-22
  Right Wrinkle Label 4-19
  Self Test Reference Table 4-17
  Sequence of Formats 4-18
  Speed A Label 4-20
  Upper Smear Test Label 4-21
  Usable Area Speed A Label 4-20
Downloading Firmware 4-39

E

Electrical Adjustments 4-29
  Cutter Voltage 4-32–4-33
  Printhead Voltage 4-29–4-31
Electrical Requirements 1-2
Electronics System Block Diagram 1-14
Environmental Ranges 1-2
Equipment Safety 4-2
External Rewind Mode 1-1

F

Factory Assistance 3-11
Factory Default Reset 2-19
Factory Default Values 2-20
Feed and Pause Key 2-19
Feed Key 2-3, 2-18
Feed Key Rollback Test 4-23
Fonts 1-3
  Bitmapped 1-3
  International Characters 1-3
  Matrix (203 dpi) 1-3
  Optional 1-3
  Scalable 1-3
  Standard 1-3

G

Green Light
See Operator Indicators 2-1

I

International Characters 1-3

L

Label
Head Temp Test 4-21
Left Wrinkle 4-19
Lower Smear Test 4-22
Pause and Cancel Key 4-18
Right Wrinkle 4-19
Speed A 4-20
Upper Smear Test 4-21
Language, Zebra Programming 1-7
LED Quick Reference Chart 3-2
Liner Rewind Power Roller Adjustment 2-30
Loading
Ribbon Supply Spindle 2-12
Lubrication 4-15

M

Main Drive Belt
.....4-51–4-52
Main Logic Board 4-38
Downloading Firmware 4-39
Installation 4-38–4-39
Removal 4-38
Manual Calibration 2-22
Mechanical Adjustments 4-23
Liner Rewind Spindle 4-28
Printhead Position 4-23–4-25
Strip-Plate 4-27
Media Loading 2-6
Cutter Mode 2-6
Fanfold Media 2-6
Peel-Off Mode 2-9
Removing the Liner 2-10
Roll Media 2-6
Tear-Off Mode 2-6
Media Sensor 2-10
Media Sensor Assembly 4-49
Installation 4-49–4-50
Removal 4-49
Memory
Options 1-5
Upgrade 4-62
Memory Specifications 1-5
Mode
Cutter 1-1
External Rewind 1-1
Peel-Off 1-1
Printer Operating 1-1
Tear-Off 1-1
Mode Key 2-3, 2-19
Modes, Printer Operating 1-1

O

Operating Modes, Printer 1-1
Operations Overview 2-1
Operator Controls 2-3
Cancel Key 2-3
Feed Key 2-3
Mode Key 2-3
On/Off Switch 2-3
Pause Key 2-3
Operator Indicators 2-1
Calibrate Status 2-2
Darken Status 2-2
Data Status 2-1
Green Light 2-1
Paper/Ribbon Status 2-1
Pause Status 2-1
Power Status 2-1
Printhead Status 2-1
Yellow Light 2-1
Operators Indicators
Position Status 2-2
Optional Fonts 1-3

P

Paper/Ribbon Status Indicator 2-1

Parallel Data 1-12
Connector Pinouts 1-13
Signal Levels 1-12
Pause and Cancel Key Self Test 4-16
Pause Key 2-3, 2-17
Pause Key Loopback Test 4-22
Pause Status Indicator 2-1
Peel-Off Mode 1-1
Personal Safety 4-4
Physical Dimensions 1-5
Platen Roller Replacement 4-53–4-54
Position Status Indicator 2-2
Power On/Off Switch 2-3
Power Status Indicator 2-1
Power Supply 4-57
Board Installation 4-58–4-60
Board Removal 4-57–4-60
Power-On Self Test 2-14
Print Darkness 2-23
Setting Manually 2-25
Testing 2-24
Print Mechanism Assembly Removal ... 4-40
Print Speeds 1-6
Printer Operating Modes 1-1
Printhead
Assembly Removal and Installation 4-41– 4-43
Pressure Adjustment 2-29
Status Indicator 2-1
Printing Considerations 1-6
Printing Method 1-6
Programming Language, Zebra 1-7

R

Ranges
Environmental 1-2
Operating 1-2
Storage 1-2
Removing
Front Door 4-34
Liner 2-10
Main Door 4-34
Rear Cover 4-34
Used Ribbon 2-13
Repair Service Department 3-11
Requirements, Electrical 1-2
Returning Equipment 3-11
Ribbon 1-7
Parameter 2-23
Supply Spindle Disassembly 4-44
Supply Spindle Installation 4-45–4-48
Take-Up Motor Replacement 4-55
Routine Adjustments 2-29
Printhead Pressure 2-29
Rewind Power Roller 2-30

S

Scalable Fonts 1-3
Self Test 2-14
Calibration Quick Reference 2-15
Cancel Key 2-16
Feed Key 2-18
Mode Key 2-19
Pause and Cancel 4-16
Pause Key 2-17
Power-On 2-14
Reference Table 4-17
Self Test Reference Table 4-17
Serial Data Connector 1-9
DB-9 Pinouts 1-11
RS-232 Interconnection 1-10
RS-232 Signal Levels 1-11
Specifications
Agency Approvals 1-2
Communication 1-9
Media Considerations 1-4
Media Handling 1-4
Memory 1-5
Microprocessor 1-5
Physical Dimensions 1-5
Print Speeds 1-6
Printing Considerations 1-6
Printing Method 1-6
Ribbon Considerations 1-7
Serial Data 1-9
Status Indicators

See Operator Indicators 2-1
Status Lights
See Operator Indicators 2-1
Stepper Motor Replacement 4-56–4-57

T

Tear-Off
Mode 1-1
Plate Removal 4-36
Position Adjustment 2-27
Technical Support 3-11
Top of Label Position Adjustment 2-28
Troubleshooting 3-1
Cutter-Related 3-9
Jammed or Stuck Labels 3-8
LED Quick Reference Chart 3-2
Printer Status Sensors 3-9, 3-10
Problems with LED Indications .. 3-3, 3-6
Settings or Parameter-Related 3-9
Wrinkled Ribbon 3-8

Y

Yellow Light
See Operator Indicators 2-1

Z

Zebra Programming Language 1-7
ZIP Support 3-11
ZPL II 1-7